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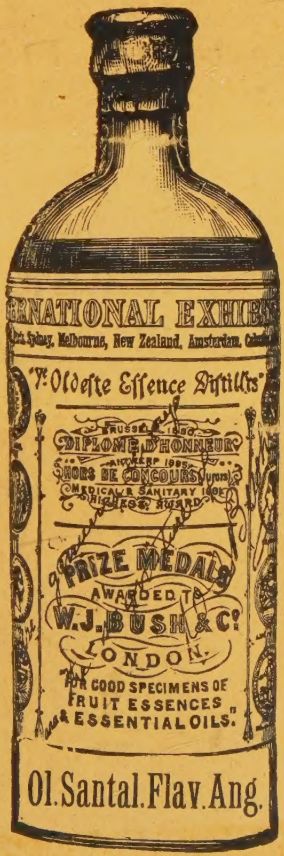

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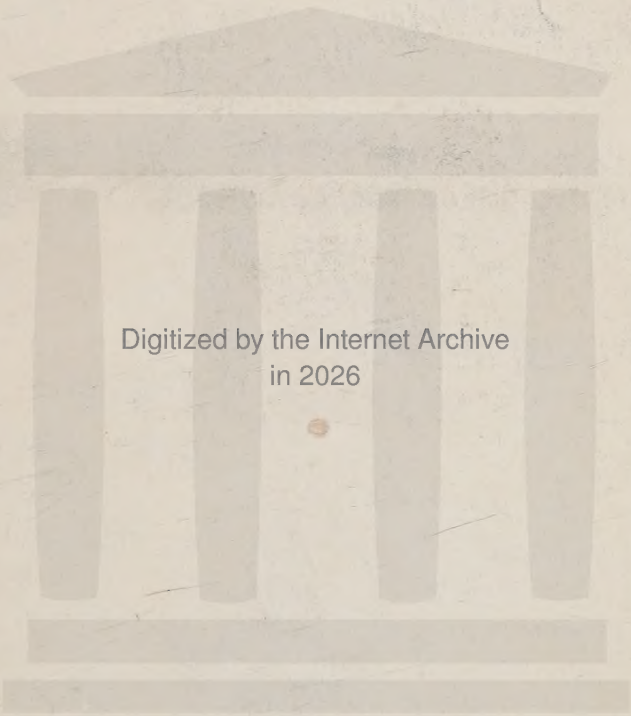

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COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS

FROM JULY 1, 1903, TO JUNE 30, 1904,

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-FIRST ANNUAL MEETING

HELD IN

SHEFFIELD,

AUGUST, 1904

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(*a*) To bring under the notice of pharmacists, principals, and their assistants, in their districts, who are unassociated with the Conference, the advantage of membership with it, and by personal effort to try and induce them to join.

(*b*) To assist in stimulating research by asking pharmacists, who have the time, ability, and disposition, to contribute from time to time a paper or useful note to the annual meetings.

(*c*) To endeavour to induce defaulters to continue their membership.

(*d*) To take generally a watchful and sympathetic interest in the affairs of the Conference.

To render those services voluntarily at times convenient to themselves and as opportunity offers.

LIST OF CONTENTS.

	PAGE
Introduction	1
Chemistry	15
Materia Medica	187
Pharmacy	257
Notes and Formulæ	315
Research List	359
Constitution and Rules of the British Pharmaceutical Conference	365
Honorary Members of the Conference	366
Foreign and Colonial Members	367
Home Members	371
Presentation Copies of the Year-Book, to whom forwarded	391
List of Journals presented to the Conference	391
Programme of the British Pharmaceutical Conference	393
Tables of useful Information for Pharmacists	593
General Index	609

INTRODUCTION.

It will be noted that in the Chemical Section of the present *Year-Book* the abstracts given deal almost solely with such subjects as have a more or less direct pharmaceutical bearing, or concern the constituents or purity of drugs. It is with regret that much interesting matter, both in Inorganic and Organic Chemistry has to be omitted, but the space at disposal being limited, we have no alternative but to confine ourselves to what is rather the technical than the general side of the wealth of chemical literature of the current year. For this reason, practically no reference will be found to *radium*, the marvellous properties of which are now a matter of general knowledge, due to the brilliant researches of the *Curies*, *Dewar*, *Rutherford*, *Soddy* and others. As anticipated last year, these researches have stimulated investigation on radiation in other directions, with the result that *R. Blondlot* has discovered a most interesting class of rays, which he has called *N-rays* and N_1-*rays*. Since this work has attracted less attention in this country, and the investigations of *A. Charpentier*, *J. Becquerel*, and others indicate that these rays, which are given off by nerves and muscles of the animal body, may lead to important results in medical diagnosis, we have somewhat fully summarized the results hitherto published.

In the domain of Inorganic Chemistry, *arsenic* and its compounds, as usual, occupy considerable attention. *G. Bertrand* and *A. Gautier* both deal with its detection in minute quantities, the latter having perfected a method for its complete precipitation. *T. E. Thorpe* has availed himself of the *electrolytic* decomposition of water as affording pure hydrogen for the application of the classic Marsh test; *H. J. G. Sands* and *J. E. Hackford* suggest a modification of this method. *W. A. H. Naylor* adapts his *iodometric method* for the determination of *arsenates* to the official sodium arsenate and its solution. *L. Dobbin* deals with the interaction of lead acetate and *sodium arsenate*. *A. E.*

Bell directs attention to the very delicate *biological* test by the cultivation of *Penicillium brevicaule* for the detection of the metalloid. *R. Dupuoy* gives a method for the production of pure *arsenic tri-iodide*, and *W. Duncan* a process for its titration. *F. H. Alcock* notes the gross adulteration of *antimony chloride* solution with sulphates. *P. Planés* has devised a rapid *colorimetric* method for the *determination of bismuth*, based on keeping bismuth iodide in solution with glycerin. A useful process for the preparation of *bismuth lactate* is contained in the *Supplement to the Dutch Pharmacopœia*. *W. Lyon* notes that *bismuth salicylate* may contain free acid, for which a ready test is given. *P. Thibault* describes in detail *bismuth proto-catechuic acid*, the constitution of which throws a light on the nature of other similar compounds. *J. McDowall* publishes a method for the volumetric determination of *cyanogen* by means of the decolorization of cupric ammonio-sulphate solution. *A. Leys* gives a method for the detection of *fluorides*, used for preserving butter, an objectionable addition which was, at one time, likely to become prevalent. *F. H. Alcock* publishes a process of *alcoholimetry* modified to meet the requirements of official spirituous preparations containing *free iodine*; the same author notes the occurrence of an excess of *nitric acid* in *solution of ferric chloride*. *G. Ferrier* criticizes the official formulæ of the *hydrated carbonates of zinc and magnesium*. *D. B. Dott* calls attention to the presence of *manganese* as an impurity in *zinc sulphate*. *Saint-Serin* gives working formulæ for the preparation of *mercurous* and *mercuric methylarsenates* in a crystalline form. Both *Richard* and *E. Holdermann* treat of the constitution of *mercury oxycyanides*; the commercial article sold under this name evidently requires close watching. *K. Friedrich* calls attention to the presence of *silver* as an impurity in *potassium cyanide*. *L. Dobbin* describes a new *scale preparation, potassium ferric arsenite*, which should find useful application in medicine. Now that *sulphurated lime* is so largely used in agricultural chemistry, the simple method for its *titration* described by *R. H. French* should prove valuable. *C. T. Bennett* finds that the presence of *lead* is almost universal in *commercial acetic acid*; the source is traced to the glass carboys in which it is stored. He gives a method for its detection, also in *citric* and *tartaric acids* and their salts. *P. Schidrowitz* shows that *sulphuric acid* may be determined by direct titration in *vinegar*. *Katz* has solved a problem which has long attracted the

attention of pharmacists by publishing a convenient and handy method for determining *free phosphorus* in *oily solutions*.

In the section of Organic Chemical Analysis *E. Dowzard* shows that the addition of magnesia enables the analyst to obtain more accurate results when determining the total solid residue of *compound tincture of benzoin*. Recent prosecutions under the *Sale of Food and Drugs Act* for the sale of flavoured alcohol as *brandy* will impart interest to the valuable contribution from the *Paris Municipal Laboratory* to the analytical chemistry of brandy and its substitutes. Of a similar nature, the very complete treatise of *A. E. Leach and H. C. Lythgoe* on *cider vinegar* should be of service to British analysts. *W. Wobbe* gives a useful series of tests for *anæsthetic ether*. *A. Leclère* uses *formic acid* to separate iron from aluminium. *E. Thorpe* and *J. Holmes* avail themselves of the fact that *ethyl alcohol*, under certain conditions, is almost wholly oxidized into acetic acid, whereas *methyl alcohol* yields carbonic acid, to determine the amount of the methyl alcohol in ethyl alcohol. *J. W. Gladhill* gives a useful array of analytical data for the various kinds of *commercial peppers*. *M. Dechan* proposes to determine the value of *pepsin* from the amount of peptones it can form, and *E. H. Gane* shows that the requirements of the U.S.P. for *petroleum benzin* are not met with by commercial specimens. *H. Henriet* finds that *formaldehyde* is a normal constituent of the atmosphere; *A. Trillat* that it is invariably formed, in measurable quantity, whenever organic matter is burned. *A. Desmoulière* shows that *salicylic acid* is widely distributed in the *N.O. Violaceæ*. *C. Kleber* and *G. Lemme* both give processes for the determination of *formaldehyde* based on the liberation of alkali when the aldehyde reacts with alkaline sulphite. This method has also found application for the determination of other *aromatic or fatty aldehydes*, by *S. S. Sadtler*, who employs it for the determination of *citral*. *H. E. Burgess* also adapts the reaction for similar purposes. *A. Searl* has rendered abortive what might have become a serious and widespread sophistication, by giving a test to detect the substitution or admixture of *yeast extract* and *meat extract*.

To instance the advance made in the knowledge of the chemistry of essential oils we may recall that some twenty-five years ago much speculation was rife as to the different chemical constituents of cinnamon bark and cassia bark oils, and the subject was included in the "*Conference Blue List*" for investigation. A

perusal of the communications then published, which were well abreast of the knowledge of the time, will give a good indication of subsequent progress. Since then, essential oils, at that time neglected by chemists, have become a favourite and profitable field of research, both from a scientific and commercial point of view. In no domain of Organic Chemistry has greater advance been made. The present year has added its quota to the total. *K. Keimazu* describes a new Formosan essential oil, *apopin oil*, used as an admixture with camphor oil. *Para-cresol*, *benzaldehyde*, *benzyl alcohol*, a menthone-like *ketone*, *anisic* and *cuminic aldehydes* have been added to the constituents of the *essential oil of Acacia farnesiana* flowers by *Schimmels*, and they have patented a combination of these and other constituents for a "synthetic" cassie oil: while that of *Acacia cavenia* is shown to contain *eugenol*, *methyl salicylate*, *benzyl alcohol*, *geraniol*, *anisic aldehyde* and *eugenol-methyl ester*. *Lauric aldehyde* has been isolated from the oil of *Abies pectinata*. *E. Tardy* has isolated the constituents of the oil of *boldo leaves*. *J. C. Umney* notes the change in characters shown by *cajuput oil* compared with what was found in commerce some years ago. *Schimmels* describe the new *oil of Calyptranthes paniculata*, which contains 62 per cent. of citral. The scarcity and high price of *camphor* has stimulated efforts at its artificial production; *A. Collins* describes a patented process for its synthesis from turpentine oil. *Cineol*, *borneol*, and *terpineol* have been isolated by *Schimmels* from *camphor oil*, which has already yielded so many valuable constituents. *E. E. Blaise* gives a working method for isolating *angelic* and *tiglinic acid* from *chamomile oil*. *Cassia oil* is still adulterated with rosin, for the presence of which *Schimmels* give a simple test. *H. Thoms* and *B. Molle* have succeeded in reducing *cineol*, obtaining a new hydrocarbon, *cineoline*, $C_{10}H_{18}$. *J. Hanus* gives a method for the gravimetric determination of *cinnamic aldehyde*, precipitating it as a semi-oxamazone. *E. Goulding* finds that the essential oil of *Cinnamomum pedatinervium* contains *safrol*, *linalol*, *eugenol*, and *methyl eugenate*. *Schimmels* state that the official requirements of the B.P. for the specific gravity of *cinnamon bark oil* are too high, and point out that the best oil is not that which is richest in cinnamic aldehyde. They do not agree with *Parry* and *Bennett* as to the nature of the adulterant of *citronella oil*, considering it to be Russian petroleum and not resin spirit. They also give a modification of their well-known test for this oil, which

increases its sensitiveness. *K. Bamber* has also published a test with the same object in view. *H. Thoms* modifies his original method for the determination of *eugenol* in clove oil in the light of recent criticism, and *Schimmels* further modify the soda absorption method by using a 3 per cent. solution of NaOH as the solvent instead of 5 per cent. They also announce the occurrence of a new *sesquiterpene alcohol*, $C_{15}H_{25}OH$, in the oil of *Eucalyptus globulus*. *H. von Soden* has contributed another important paper on the constituents of the *essential oil of flowers*, dealing now with the "flower extract oils" of *violet*, *orange*, *reseda*, *rose*, *jasmin* and *acacia*. *A. Hesse* makes a further communication on the presence of *methyl anthranilate* and of *indol* in jasmin oil. *E. Bourquelot* and *H. Hérissey* find that the root of *Geum urbanum* forms *eugenol* by the action of a ferment. *Schimmels* add *amyl alcohol*, *pinene*, *phellandrene* and *linalol* to the constituents of geranium oil. They also find a *new alcohol*, closely related to geraniol, in *gingergrass oil*. *E. J. Parry* reports on some *West Indian* grass oils.

H. Thoms and *B. Molle* give a complete examination of the oil of *Laurus nobilis* leaves. The official characters of *English lavender oil* are commented on by *J. C. Umney*. *H. E. Burgess* and *T. H. Page* announce the occurrence of a new sesquiterpene in *distilled lime oil*. *P. Genvresse* describes some characteristic compounds of sesquiterpenes with *paraformaldehyde*. *H. Thoms* has examined the oil of the leaves of *Monodora myristcia*, finding *lævo-limonene* and an alcohol, probably *myristicol*, to be the main constituents. *H. von Soden* and *W. Treff* give further characters of the new alcohol, *nerol*. *J. C. Umney* and *C. T. Bennett* report favourably on *South American orange-flower oil*, while *Schimmels* describe *Spanish oil of neroli portugal* and *bigarade*. *Thoms* shows that *French parsley oil* is deficient in *apiol* compared with the German product, its place being taken by *myristicin*. *W. H. Simmons* reports on an adulterated *patchouli oil* and *Schimmels* deal very fully with the chemical constituents of the genuine oil. Yet other adulterants are added to the long list of those used in *peppermint oil*; *E. J. Parry* and *C. T. Bennett* find *African copaiba oil* to be used; the latter also records the use of *cedarwood oil* for the same purpose. *Schimmels* add *cineol*, *lævo-phellandrene*, *caryophyllene*, *methyl-eugenol* and *palmitic acid* to the already known constituents of *pimento oil*. *L. Bouveault* and *Gourmand* have succeeded in synthetizing *rhodinol*, the separate existence of which they

therefore claim to have established. *H. von Soden* and *W. Treff* find that *rose oil* contains *eugenol* and a *sesquiterpene alcohol* related to *farnesol*. *F. Hudson Cox* and *W. H. Simmonds* advocate the determination of the iodine absorption equivalent in the analytical examination of *rose oil*, and adduce figures which are of significant value. *E. J. Parry* and *C. T. Bennett* give further physical constants for *East Indian sandal oil*. *O. Schreiner* usefully summarizes the present knowledge of the sesquiterpenes. *Spike oil* is found to be adulterated by *E. J. Parry* and *C. T. Bennett*. *F. B. Power* and *F. H. Lees* have exhaustively examined the *oil of Umbellularia californica*, the so-called Californian laurel; the latter author deals at length with the constitution of the new ketone *umbellulone*, $C_{10}H_{14}O$, isolated by them therefrom.

Resins and their allies have continued to receive attention at the hand of *A. Tschirch* and his pupils. In conjunction with *O. Saal* he has examined *Carana elemi*, the *elemi* of *Colophonia maritima* and, with *L. Reutter*, *Caricari elemi*. With *L. Weil* *gurjun balsam* has been investigated, and with *E. Schmidt* the *turpentine of Pinus laricio*. *L. Reutter* is also collaborator in a research on *mastic*, and *P. Studer* in an investigation on *American colophony*. In connexion with the latter *W. Fahrion* also publishes a communication. *A. Tschirch* and *G. Schmidt* publish a very complete table of the *resin acids of the Coniferæ*, isolated by the former in the course of his researches. *T. H. Easterfield* and *G. Bagley* also contribute a communication on the same subject.

Two resins, *Gommier resin* and that of *Hopea odorata*, are subjects of reports from the *Laboratory of the Imperial Institute*. *Kraemer and Sarthou* give a simple method for determining the *melting point* of resins and waxes, and *R. Dieterich* for the determination of their *solubilities*.

Several notable publications on the chemistry of the fixed oils call for notice. *C. H. Kunz-Krause* and *P. Schelle* have isolated a new crystalline fatty acid, *cyclogallipharic acid*, $C_{21}H_{36}O_3$, from galls. *Chaulmoogra oil* has received considerable attention; *F. B. Power* and *F. H. Gornall* have isolated from it the fatty acid, *chaulmoogric acid*, $C_{18}H_{32}O_2$. The so-called gynocardic acid of previous workers is believed to be a mixture of several fatty acids. The source of commercial chaulmoogra oil is stated not to be *Gynocardia odorata* but *Taraktogenos kurzii*. The seeds of the former contain a cyanogenetic glucoside,

gynocardin. *E. Hirschsohn* finds *commercial chaulmoogra oil* to be far from pure. *J. Schindelmeiser* gives the characters of *gynocardic acid*, $C_{21}H_{40}O_2$, isolated from oil pressed from the seeds. *J. Leukowitsch* has published numerous notes on oils, including those of *Pongamia glabra*, *Moringa pterygosperma* or "*ben oil*"; *Melia azedarach*, and a comparative examination of the fixed oils of *almond*, *peach*, and *apricot kernels*. *W. D. Richardson* notes the occurrence of genuine *lard* with a high iodine value. *E. Dowzard* advocates the use of the refractometer in the examination of *cod liver oil*; *J. C. Umney* and *C. T. Bennett* report on the characters of a sample of *fish oil*. *Lahache* gives a method for detecting the admixture of *coconut fat* with butter. *R. Locquin* suggests a method for the identification of the fatty acids by first converting them into acetol esters, forming the semicarbazone and determining the melting point thereof. Important advances have been made in the study of the hydrolysis of the fatty esters, on the one hand, by certain ferments; and the esterification of the fatty acids, on the other hand, by other biological reagents.

H. M. Gordin deals with the *Xanthoxyllins* in a paper read before the *American Pharmaceutical Association*. *T. Klobb* has isolated *arnisterin*, $C_{28}H_{46}O_2$, from arnica flowers. *J. D. Riedel* has found *yangonin*, $C_{10}H_8O_3$, in *Piper methysticum*. *Posternak* claims that all plants contain *phytin*, $C_6H_8P_2O_9$, a nutritive reserve material. *Spilanthol*, $C_{37}H_{64}N_2O_3$, is found by *Gerber* to be the active principle of *Spilanthes oleracea*. *Aspidium athamanticum* has been examined by *A. Anton*, who has isolated a new acid therefrom, *pannic acid*, $C_{12}H_{12}O_4$. *E. Bourquelot* has traced the presence of *sucrose*, by means of the ferment invertin, in a large number of plants. *R. Tiemann* publishes an exhaustive note on the chemistry of *Globularia alypum*. *E. Gibson* announces a new glucoside, *ponticin*, $C_{21}H_{24}O_9$, from *Rheum rhaponticum*; *Grein* finds another, *herniarin*, $C_{34}H_{59}O_{19}$, in the herb *Herniaria glabra*. *W. Friboes* obtains four distinct *saponins* from *Guaiacum officinale*, which are said to be non-toxic. *Entada scandens* is also found by *L. Rosenthaler* to contain *saponins*. *H. A. D. Jowett* and *C. E. Potter* deal with the *constituents of commercial chrysarobin*, and subsequently discuss the constitution of *chrysophanic acid*, and of *emodin*. An alkaloidal glucoside, *casimirose*, $C_{30}H_{32}N_2O_5$, is found by *W. Ricke* in the fruits of *Casimiroa edulis*. *Barringtonia speciosa* seeds have given *Driessen-Mareeuw barringtogenitin*, $C_{15}H_{24}(OH)_3$,

barringtonin, $C_{18}H_{25}O_7(OH)_3$, and a saponin. *E. Bourquelot* has further investigated *aucubin*. In a communication to the *Royal Society*, *W. R. Dunstan* and *F. H. Henry* describe a new cyanogenetic glucoside, *phaseolunatin*, $C_{10}H_{17}O_6N$, from the seeds of *Phaseolus lunatus*. Further investigations by *E. White* on the constituents of *kino* have failed to give any definite crystalline constituents. *F. B. Power and F. Tutin* find a lævogyre *quercitol* in the leaves of *Gymnea sylvestre*.

No very important new alkaloid appears to have been reported during the past year. The attention of chemists is now rather directed to improving our knowledge of the constitution of those already isolated. Probably the *methyl-substituted bases*, such as are described by *Pschorr* and others, will, in the near future, play an important part in therapeutics, since their physiological action seems to be profoundly modified by this chemical change. *E. H. Farr* and *R. Wright* have concluded their investigations of the alkaloids of *Conicum maculatum* with a very complete observation of the distribution of the bases in the plant. The same authors have further investigated the matter of the occurrence of *mydriatic alkaloid* in *Lactuca virosa*, and find that such exists in very minute quantity in the fresh herb, and more in the extract. *Bredemann*, as well as *H. Blau*, publish methods for the determination of *colchicine*. *E. Léger*, directing his attention to alkaloidal work, gives an admirable criticism of the *thalleioquin test* for quinine; publishes methods for the alkaloidal assay of *nux vomica*, *St. Ignatius beans*, *ipecacuanha*, *cinchona*, and *pomegranate bark*. *H. A. D. Jowett* makes further contributions to the knowledge of the constitution of *pilocarpine*, and also of *epinephrine* (adrenaline). *C. Moureu* and *A. Valeur* discuss *sparteine* and its *sulphate*; *M. Francois* deals with the determination of *pyridine*; *Waldbott* advances a new method for the assay of *nicotine*. *E. Dowzard* minutely discusses the determination of *morphine* in opium and its preparations; *P. Schridrowitz* gives a new method for the same purpose. *A. G. E. Paterson* describes what purports to be an improved method for the determination and separation of the *bases of ipecacuanha*. *W. Garsed* gives a process for the separate determination of the *coca alkaloids*. *E. Beuttner* publishes detailed methods for the assay of various *alkaloidal galenicals*. *G. Frerichs* treats of the bases of *cusparia*. *L. Spiegel* gives further details concerning *yohimbine*.

In the section dealing with Materia Medica an interesting

note on *Aquillaria agallochia* by *D. Hooper* will be found. *A. B. Lyons* treats of a general method for the *assay of alkaloidal drugs*. *H. Maustbaum* gives the characters of Portuguese beeswax. *E. S. Hooper* describes the characters of a so-called *Beilschmeidea* bark. *E. Dowzard* compares the characters of *Oregon* and *Canada balsams*. *H. G. Greenish* has published a very full description of the anatomical structure of the various commercial *coca leaves*; in conjunction with *E. Collin* he has added a further series of descriptive articles on the microscopic characters of *officinal roots and rhizomes*. *E. M. Holmes* deals with *Ipomea orizabensis*, which has again appeared in the London and German drug markets; also with *Guadeloupe jaborandi*, and the seeds of *Spermacoce indica*; on the last a note by *D. Hooper* also appears. *H. Finnemore* describes a spurious *Virginian prune bark*. *R. H. True* finds *Ruellia ciliosa* to be substituted for *Spigelia marylandica*. The preparation and characters of *podophyllum resin* are fully treated of by *H. J. Lohmann*, and *D. B. Dott* reiterates the diverse experiences recorded by different workers with podophyllin, especially that derived from *P. emodi*. *E. Dowzard* gives a rapid method for the determination of resin in *gum scammony*. *E. Gilg*, *H. Thoms* and *H. Schedell* publish an important communication on *Strophanthus*, advocating the adoption of *S. gratus* seeds as the source of the official drug. *J. E. Saul* finds that sulphuric acid and alcohol alone are sufficient to give Bell's reaction for *turmeric* without the use of diphenylamine as directed by the latter. *Goeller* calls attention to certain *vanillas* which contain *heliotropin* instead of vanillin. *W. Lohmann* contradicts the generally accepted opinion that *saponin* is toxic. *C. R. Marshall* has established the relative physiological action and value of the *jaborandi alkaloids*; *Landrin* and *Dybowski* have done the same with *ibogaine*. *T. Maben* discusses the *alkaloidal standards* for *hyoscyamus* and its preparations. *H. S. Collins* has found some commercial specimens of *powdered gentian root* to be grossly adulterated. *E. Clément*, as well as *L. Garrigue*, claim remarkable invigorating and tonic properties for *formic acid*. *J. U. Lloyd* publishes an appreciative note on the value of *Echinacea angustifolia* as a blood purifier. *E. H. Gane* gives simple and practical tests for the purity of *cod liver oil*. *C. Sigalus* notes the physical characters of authentic *croton oil*. *E. Dowzard* would fix the oil content of *powdered colocynth pulp* at 2 per cent. *W. Chattaway* and *C. G. Moor* publish a very complete table of

ash determination of crude drugs, showing the results of other workers besides their own. *J. C. Umney* comments on certain of the discrepancies between his own figures and those of the above-named authorities.

Remedies, new, newly applied or modified will be found to be fully described, as usual, since it is necessary for the pharmacist to be well posted in the nature and properties of the latest additions to therapeutics. With a few notable exceptions, it would appear that nothing of great value has been produced in this direction during the past twelve months.

In pharmacy proper many useful and practical notes have appeared, the Evening Meetings of the *North British Branch* of the *Pharmaceutical Society* having furnished several papers of noteworthy interest. Among these may be noticed the communication of *A. W. Gerrard* on the manufacture of *adhesive plaster*. *C. S. N. Halberg* also read a paper on *lead plaster* and *lead oleate* before the American Pharmaceutical Association. On the same occasion *L. C. Hopp* dealt with the much discussed question of *suppository moulds*. *T. Maben* has been a prolific contributor of pharmaceutical notes, his répertoire including suggestions for the *standardization of tinctures*, of *podophyllin resin, jalap resin; jaborandi preparations: gelsemium tincture; colchicum, henbane, coca, and belladonna preparations*. *F. H. Alcock* gives an improved method for preparing *sulphur iodide*, suggests the use of *sodium pyroarsenate* in the preparation of *sodium arsenate solution*; comments on the varying quality of *tincture of cinnamon*, and suggests alterations in the formula of *Pilula ferri*. *E. W. Lucas* and *H. B. Stevens* also find the official formula for this pill unsatisfactory; the former criticizes the official formula for *oxymel of squill*; and advocates the use of *aluminium bronze* as a material for pharmaceutical evaporating vessels. *Turpentine liniment* is again the subject of note, from *W. Knight*. *H. Finnemore* would improve the formula for *mercury liniment*, and substitute a suspension of *tragacanth* in alcohol for the extemporaneous preparation of the official *mucilage*, which does not keep. *G. Roe* makes useful observations on the *solubility of strychnine* in certain mixtures in which it is often prescribed. *H. G. Greenish* and *F. A. Upsher Smith* conclude their investigation on the *solubilities of the official chemicals*; the former also publishes a table of *saturated solutions of official salts* which will be useful for dispensers. *J. Lothian* would include official formulæ for *hard and soft soaps*

in the B.P. *G. M. Beringer* gives a modified formula for *Sapo mollis U.S.P.* *J. Lothian* also improves the process for *glycerin suppositories*, and for *granular effervescent preparations*. *M. Meldrum* gives a formula for *paraldehyde mixture*, and an *excipient* for *potassium iodide and mercuric iodide pills*. *P. H. Marsden* contributes many useful formulæ. *S. Lewis* improves the process for *liquid extract of Nux vomica*; *G. Lunan* that for glycerin of borax; *G. E. Perry* that for *Easton's syrup*. *T. S. Barrie* calls attention to the occasional alkaline reaction of *lead acetate solution*. *P. Boa* criticizes the official directions for the preparation of *glycerin of pepsin*. *R. C. Cowley* and *J. P. Catford* advocate the establishment of a simple ratio of strength between the *dilute acids* and *alkalies* of the B.P. *G. F. Merson* simplifies the method of preparing *caffeine citrate*. *H. Wilson* gives a practical note on the *dispensing of resinous tinctures*. *D. B. Dott* discusses the *morphine standard* for opium and its preparations, and suggests the inclusion in the B.P. of a test for excess of acid in *Liquor ferri perchlor. fort.* *P. Guigues* has compared the official processes for the preparation of *liquid extract of licorice*, and concludes that the U.S.P. product is the best product. *W. Lyon* suggests correcting the acidity of this B.P. liquid extract. *D. Hooper* confirms *E. White* as to the *gelatinization of kino* being due to a *ferment*. *A. Astruc* and *J. Robert* recommend the use of *Gum acacia* to prevent precipitation if many incompatibles, but *E. Bourquelot*, in a communication of great pharmaceutical importance, points out the danger of the indiscriminate use of this gum, since it contains an *oxydase* of great activity which profoundly alters the chemical characters of many salts and active principles. *H. G. Greenish* contributes a note on the pharmacy of *chamomile flowers*, showing how to avoid decomposition of the bitter principle. *E. A. Ruddiman* gives a useful note on the *incompatibles of the newer remedies*. *Debono* points out the decomposition resulting from the simultaneous prescribing of *bismuth salts* with *potassium iodide*, and *F. Gay* uses *citric acid* to prevent *precipitation* of certain tinctures. *A. S. Johnson* gives a process for preparation of *iron peptonate scales*. *J. P. Remington* reverts to the value of *acetic acid* as a menstruum for the preparation of *fluid extracts*. *Ethereal oil* is again the subject of a note, now from *J. W. Brandel*.

Many useful and suggestive pharmaceutical formulæ are given, such as those suggested by the *Committee of the U.S. National Formulary*, selections from the *Pharmaceutical Specialities of*

Luxemburg Apothecaries' Association, the *Formulary of the Liverpool Royal Infirmary*, and the *Formulary* of the *Pharmaceutical Society of Antwerp*.

Among the most noteworthy publications which have appeared during the current year may be mentioned the *Supplement to the Dutch Pharmacopœia*, which contains many useful and suggestive formulæ, and worthily upholds the high reputation of the Dutch pharmacists. *W. Chattaway*, as Reporter to the General Medical Council on the British Pharmacopœia, has issued a *Digest of Researches and Criticisms* on the official processes and tests. This is an ably compiled series of abstracts of the notes and criticisms, chiefly by pharmacists, of the text of the official work.

The Notes and Formulæ in Part IV are derived almost entirely from foreign sources; certain of them are doubtless capable of modification, to meet the requirements of English pharmacy. They have been selected with a view to their practical value.

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

Abies pectinata, Presence of Lauric Aldehyde in Essential Oil of. (*Schimmel's Report, May*, 1904, 77.) By shaking the fraction of pine needle oil which boiled above 82°C. (5 mm. pressure) with bisulphite solution, lauric aldehyde has been isolated. Although it is only present to the extent of 0·3 per cent., it is an important factor in the characteristic odour of the oil. As thus obtained, the aldehyde is accompanied by free lauric acid produced by oxidation from contact with air. This is the first recorded instance of the occurrence of this aldehyde in a natural product. In addition to this, another, probably decyclic aldehyde, is present in the oil in the first portion of the above fraction, boiling at 82°C. under reduced pressure.

Abrastol (Asaprol), Colour Reactions for. E. Barral. (*Journ. Pharm. Chim.* [6], **18**, 206.) Aqueous solutions of abrastol are coloured orange by, and give a brown precipitate with, Ymonnier's reagent; blue, in the cold, with Berg's reagent, becoming gradually yellow on boiling; dirty brownish yellow with Froehde's reagent; a few particles of abrastol give a fine green fluorescence with H_2SO_4 and formalin; a greenish yellow, turning to brown, when heated with sodium persulphate; a similar tint, turning dirty blue, then dark blue, when heated with sulphomolybdic reagent.

Acacia cavenia, Essential Oil of the Flowers of. (*Schimmel's Report, Oct.*, 1903, 18.) The oil examined was obtained from concrete petroleum ether extract of the "Cassie romaine,"

Acacia cavenia. The oil distilled by steam from this contained about 50 per cent. of phenols, chiefly eugenol ; about 8 per cent. of methyl salicylate, and 42 per cent. of non-phenols. These comprised benzyl alcohol, geraniol, anisic aldehyde, eugenol methyl ester ; probably also linalol, decyclic aldehyde and a violet ketone, ionone or irone.

Acacia farnesiana Flowers, Essential Oil of. (*Schimmel's Report, May*, 1904, 23.) From the oil extracted from "Cassie pomade" by ether, para-cresol has been separated, also benzaldehyde and benzyl alcohol, a ketone having the odour of menthone, and anisic and cuminic aldehydes. (See *Year-Books*, 1901, 17 ; 1903, 19.)

Acetanilide and Phenacetin, Distinctive Reactions for. E. Barral. (*Journ. Pharm. Chim.* [6], 19, 237.) *Acetanilide* gives with phosphomolybdic reagent a bright yellow precipitate, which is soluble on heating. *Phenacetin* gives a similar precipitate, but it is insoluble when warmed.

Mandelin's reagent gives a red colour with solutions of *acetanilide*, rapidly changing to greenish brown. *Phenacetin* gives an olive green colour in the cold ; when warmed, this becomes reddish brown. *Phenacetin* gives a yellow colour, becoming orange on prolonged boiling, with sodium persulphate. Warmed with bromine water, a few crystals of *phenacetin* develop a rose tint, the liquid being orange yellow ; on cooling it throws down a brown precipitate. With Millon's reagent *phenacetin* gives a yellow colour, passing to red on warming. Nitrous fumes are evolved and a yellow precipitate is formed.

Acetic Acid and Vinegar, Detection and Determination of Mineral Acid in, by Direct Titration. S. Schidrowitz. (*Analyst*, 28, 233.) Sulphuric acid may be titrated direct in acetic acid, using methyl orange as indicator, if the liquid under titration be first mixed with an equal volume of alcohol and 1 c.c. of alcohol be subsequently added for every 3 c.c. of normal alkali used in the titration. The presence of alcohol in this proportion entirely prevents any reaction of the organic acid with the indicator. As usual in performing titrations with methyl orange, a blank control, without alcohol and containing an equal volume of the indicator, should be employed.

Actinium, Radiant Energy of. A. Debierne. (*Comptes*

rend., **138,** 414.) The radiant energy of actinium emanations is found to differ very markedly from that of radium in the period of its persistence. In the case of radium this is reduced to one half in 4 days. Actinium emanations, however, and the induced radio-activity they occasion, are reduced to one half in 3 to 9 seconds. These measurements were readily obtained by determining the great and readily recorded ionization of gases by actinium emanations, which are characteristic. In addition to these rays, the actinium compounds employed were found to give off other rays which were much more permanent in their effects, their energy being reduced by one half only after several days. The source of this more persistent radiant energy is unknown; it may be due to another substance accompanying "actinium."

Ajowan Herb, Essential Oil of. (*Schimmel's Report, Oct.*, 1903, 78.) Fresh ajowan herb, cultivated and distilled in Saxony, yielded 0·12 per cent. of a light brown volatile oil, having the sp. gr. 0·8601; $[\alpha]_D + 0° 41'$ solubility in alcohol, 90 per cent. 1 : 6 with abundant separation of paraffin. It contains only 1 per cent. of thymol, and a small quantity of phellandrene.

Aldehydes and Ketones, Determination of, by the Neutral Sulphite Method. H. E. Burgess. (*Analyst*, **29,** 78.) With regard to the determination of aldehydes and ketones, essential oils may be conveniently divided into two classes—those in which the estimation is made directly with the oil, and those in which the amount is too small to allow of direct estimation, such as citron, lime, lemon, and orange oils, with which preliminary concentration is necessary. In cases in which direct estimation on the oil is possible, the procedure is as follows: Five c.c. of the oil are introduced into a 200-c.c. flask, having a neck graduated to 5 c.c. in 0·1 c.c., with a side tubulus reaching to the bottom of the flask for introducing the oil, reagents, and water. To the measured oil is added a saturated solution of neutral sodium sulphite and 2 drops of ordinary phenolphthalein solution; it is then placed in a water-bath and thoroughly shaken, when a red colour is quickly produced. It is carefully neutralized with 1–10 solution of acetic acid (or with standard acid) until, after the addition of a few drops of acid, no further colour is produced. The oil is then run up into the graduated neck, and when cold, carefully read. The

difference between 5 c.c. and the reading will give the amount absorbed, and this, multiplied by 20, the percentage. By titrating with standard acid the amount of NaOH formed a confirmation of the amount of aldehyde may be obtained.

The method gives satisfactory results for the determination of *benzaldehyde* in bitter almond oil. Since pure oil consists solely of the aldehyde, the titration method alone is available, there being no non-aldehydic portion to measure. The reaction seems to take place according to the equation

$$C_6H_5CHO + Na_2SO_3 + H_2O + C_6H_5CH\begin{matrix}OH\\SO_3Na\end{matrix} + NaOH.$$

Anisal gives theoretical results. For determining *carvone* in caraway the process is of special service, no direct method having been hitherto available. Specimens examined yielded 55–57 per cent. The reaction appears to proceed as with benzaldehyde.

Cinnamic aldehyde in cinnamon and cassia oils gives theoretical results. The following equation probably shows the reaction that here takes place :—

$$C_6H_5.CH{:}CHCHO + 2Na_2SO_3 + 2H_2O.$$
$$= C_6H_5.CHSO_3Na.CHOH.CH\begin{matrix}OH\\SO_3Na\end{matrix} + 2NaOH.$$

The same reaction probably applies in the case of citral and citronellal and all olefinic aldehydes.

Citral. The method answers well, giving theoretical results.

Citronellal forms a milky solution, and at first is very frothy. Consequently, care must be taken that none is lost through this cause. The reaction takes a considerable time and heating to complete, but gives good results. With *oil of cummin* litmus solution will be found a better indicator. A genuine oil gave 24 per cent. cumic aldehyde, which at first forms a solid compound, but on heating with the addition of acetic acid goes into a clear solution.

Oil of Dill. In the case of this oil the method will be found extremely useful, as the carvone may be estimated with accuracy. A recent distillation gave 50 per cent.

Oil of Lemongrass. The method with this oil works remarkably well, giving a sharply-defined meniscus. It has been shown by Parry that acetone is sometimes added to make the oil pass the solubility test. This would also show as aldehyde by the absorption method. Shaking the oil with water, or

determination of its refractive index, will, however, at once indicate oils thus sophisticated.

Oil of Pennyroyal. With this oil phenolphthalein does not act well as an indicator. Litmus is better. A recent oil gave 16 per cent. of pulegone.

Oil of Spearmint. The method is valuable in the case of these oils and works well, giving a clear solution. Genuine oils give about 62 per cent. carvone.

Oils of Tansy, Thuja, and Wormwood. The method is useless for these oils, for the reason that thujone, the active constituent of these oils, does not form a compound with the reagent.

Nonyl and Decyl Aldehydes. Considerable time and heating are required to complete the reaction with these substances, but good results may be obtained.

Oils in which a Direct Estimation of Aldehydes and Ketones cannot be made. In this class there are only four of importance, viz. citron or cedrat, lemon, hand-pressed lime, and orange oils. The method described under lemon oil applies to all of this class.

Having first determined the specific gravity at 15°C., the rotation in a 100-mm. tube by sodium light, and the refractive index at 20°C., the oil is next distilled, and this, if carried out carefully, will show any adulteration. One hundred c.c. of the oil to be examined are put into a distilling-flask having three bulbs blown in the neck, and fitted with cork and thermometer. This is connected to a condenser with a suitable receiver, having two vessels graduated at 10 c.c. and 80 c.c. respectively. A Brühl's apparatus answers the purpose very well. The whole is exhausted, and a pressure of not more than 15 mm. should be obtained. The flask is now gently heated by means of an oil-bath, and 10 c.c. distilled into the first tube. The next vessel is then put into position and the distillation continued until 80 c.c. have distilled over. The pressure is now relieved, and the residual oil in the flask distilled over with steam. The quantity so obtained should be carefully noted. Then the differences in rotation and refractive index of fraction 1 and those of the original oil will indicate added turpentine; fraction 2, lemon terpenes; fraction 3, the total amount of oxygenated constituents, i.e. terpeneless oil and the amount of aldehydes.

The aldehyde should be estimated on this fraction after the above two constants have been taken in exactly the same manner

as previously described. For example, supposing 7 c.c. of oil were obtained for the third fraction, and that, of the 5 c.c. taken, 2·1 c.c. were absorbed in the aldehyde determination, the percentage of citral in the original oil would be $\frac{2{\cdot}1 \times 20 \times 7}{100} = 2{\cdot}9$ per cent.

A few remarks here as to the percentage of citral contained in lemon oil may not be out of place, especially as the subject is one that has recently been the cause of dispute among several essential-oil analysts. The percentage given by this method is somewhere about 3 per cent. for genuine oils, whereas, up to some four years ago, 7–7·5 per cent. was the only figure that could be recognized as compatible with a genuine oil. This higher percentage is still maintained by some analysts, both English and Italian, although there is no known method that will give directly or indirectly a figure anywhere approaching this percentage. The facts admitted on all sides are—

1. That a genuine oil does not yield more than from 5 to 6 per cent. of concentrated, i.e. terpeneless, oil.

2. The oxygenated constituents in the 90 per cent. or so of terpenes distilled are less than 1 per cent.

3. A concentrated oil never contains more than 50 per cent. of aldehydes, the average being 46 per cent.

On the face of these facts, admitted by all experts, it seems inconceivable that any analyst should maintain a 7 per cent. standard, as, taking an oil yielding at the highest 6 per cent. of concentrated oil, only half or 3 per cent. of this would be of an aldehydic nature.

Such guaranteed 7 per cent. oils must, of necessity, be very misleading to consumers and manufacturers.

Hand-pressed lime oil treated as above should yield about 8 per cent. of aldehyde. *Citron* or *cedrat oil* about 4 per cent. With *orange oil* the first 10 c.c. distilled should show a higher rotation than the rest of the fraction. The aldehyde in the last fraction is only about 0·75 to 1 per cent. of the original oil.

Algerian Essential Oils, Two New. P. Jeancard and C. Satie. (*Bull. Soc. Chim.*, **31**, 478.) Two new essential oils, "Gouft oil" and "Schieh oil," the botanical sources of which are not stated, derived from the high tableland of Algeria, are reported on.

Gouft Oil. The oil distilled from the entire plant was bright yellow and had a terebinthinous odour resembling that of mastic. It had the sp. gr. 0·872 at 9·5°C. ; $[\alpha]_D$ −15° 20′ at 10°C. ; specific viscosity at 9·5°C., 49 ; acid value, 1 : 5 ; saponification value, 14 ; saponification value after acetylizing, 42. It was soluble in half a volume of alcohol 90 per cent., and gave a slight opalescence with the proportion 3 : 20. Seventy-five per cent. of the oil distilled over below 170°C. This contained lævo-pinene. The fraction boiling above 170°C. yielded geraniol.

Schieh Oil had an odour resembling wormwood, and was reddish brown in colour. It had the following characters : Sp. gr., 0·954 at 9·5°C. ; specific viscosity, 170 ; acid value, 8·4 ; saponification value, 66·5 ; saponification value after acetylizing, 129·5. It was soluble 1 : 1 in alcohol 80 per cent., and with a slight turbidity 1 : 20 with 65 per cent. alcohol. It contained about 15 per cent. of soda soluble constituents, consisting chiefly of dimethyl-pyrogallol ester. The higher boiling fraction of the non-phenolic portion of the oil contained thujol.

Alkaloidal Methyl Bromides and other New Quaternary Salts of Alkaloids. — P s c h o r r. (*Pharm. Centr.*, **45**, 59.) Following the successful introduction of atropine methyl salts into medicine, the following quaternary salts have been prepared, which promise to be of considerable interest in therapeutics :—

Apomorphine methyl bromide, $C_{18}H_{20}NO_2Br$, crystallizing in brittle needles from methyl alcohol or scales, from a mixture of methyl alcohol and acetone ; m.p. 180°C. Very soluble in water, the solutions less affected by light and air than salts of apomorphine. The salt crystallized from methyl alcohol and acetone retains one molecule of acetone of crystallization, which is given off under 50 mm. pressure between 120 to 130°C. *Apomorphine methyl chloride*, $C_{18}H_{20}NO_2Cl$. Prisms ; m.p. 205–210°C. More soluble than the bromide. *Strychnine methyl bromide*, $C_{22}H_{25}N_2O_2Br + H_2O$. Crystallizes from methyl alcohol in glittering unstable needles. Solubility about 1 : 20 in cold water. It loses its crystal-water at 125–130°C. under 5 mm. and melts at 254–256°C. *Strychnine ethyl bromide*, $C_{23}H_{27}N_2O_2Br$. Small cubes ; m.p. 277–281°C., with decomposition. Readily soluble in water ; sparingly so in alcohol. *Strychnine methyl chloride*, $C_{22}H_{25}N_2O_2Cl + 2H_2O$. Small scales which frit at 265°C., but do not melt at 300°C. Readily soluble in water. *Strychnine methyl sulphate*, $(C_{22}H_{25}N_2O_2)_2SO4$. Glittering

needles, melting with decomposition at 274°C. Readily soluble in water, less so in alcohol. *Strychnine methyl nitrate*, $C_{22}H_{25}N_2O_2.NO_3$. Crystallizes from alcohol in colourless prisms; m.p. 280–287°C. with decomposition. Readily soluble in water, sparingly so in alcohol. *Brucine methyl bromide*, $C_{24}H_{29}N_2O_4Br. + 3H_2O$. Small scales; m.p. 247–253°C. Soluble 1 : 10 in cold water. Loses 1 mol. H_2O at 100°C., the rest at 125–130°C. under 50 mm. pressure. *Brucine ethyl bromide*, $C_{25}H_{31}N_2O_4Br + 3\frac{1}{2}H_2O$. In scales, which decompose slowly between 217–235°C. *Brucine methyl nitrate*, $C_{24}H_{29}N_2O_4 + 1\frac{1}{2}H_2O$; crystallizes from alcohol in needles which melt between 270–272°C., with decomposition. *Quinine methyl bromide*, $C_{21}H_{27}N_2O_2Br + H_2O$; crystallizes from hot water in needles; m.p. 121–122°C. Very soluble in alcohol; in cold water only 1 : 55. *Quinine methyl chloride*, $C_{21}H_{27}N_2O_2Cl$. Needles, m.p. 190–191°C.; readily soluble in water and alcohol. *Quinine methyl sulphate* $(C_{21}H_{27}N_2O_2)_2SO_4 5H_2O$. Crystallizes as from hot water in needles; m.p. 188–189°C. *Quinine methyl nitrate*, $C_{21}H_{27}N_2O_2NO_3 + H_2O$. Needles; m.p. 91–91°C. *Quinine dimethyl bromide*, $C_{22}H_{30}N_2O_2Br_2 + 4H_2O$. Crystallizes from a mixture of alcohol and acetic ether in leaflets, which melt between 92–93°C.

Almond, Peach, and Apricot Oil, Fixed, Characters of. J. Lewkowitsch. (*Analyst*, **29**, 105.) Examination of authentic specimens of almond, peach, and apricot kernel oil gave the following results:—

Refractive Indices at 20°C.

	D.	C.	F.	G.
No. 1.	1·4715 ..	1·4688 ..	1·4780 ..	1·4835
No. 2.	1·4715 ..	1·4688 ..	1·4780 ..	1·4836
No. 3.	1·4711 ..	1·4685 ..	1·4777 ..	1·4833
No. 4.	1·4712 ..	1·4686 ..	1·4778 ..	1·4834
No. 5.	1·4710 ..	1·4685 ..	1·4777 ..	1·4833
No. 6.	1·4714 ..	1·4688 ..	1·4780 ..	1·4835
No. 7.	1·4710 ..	1·4685 ..	1·4776 ..	1·4832
No. 8.	1·4717 ..	1·4692 ..	1·4784 ..	1·4839
No. 9.	1·4715 ..	1·4690 ..	1·4782 ..	1·4837
No. 10.	1·4725 ..	1·4700 ..	1·4792 ..	1·4847

Description of Oil.	Specific Gravity at 60° F. (Water 60°F. = 1)	Saponification Value.	Iodine Value.	Butyro refractometer at 40°C.	Acid Value.	Fatty Acids.		Colour Tests.	
						Neutralization Value.	Saponification Value.	Bieber's Test.	Phloroglucinol Test.
Almond oils, expressed from:									
1. Valencia sweets	0·91995	207·6	99·4	57·5	5·16	207·8	207·6	Colourless	No coloration
2. Blanched Valencia sweets	0·9182	191·7	103·6	57·5	2·9	196·4	201·7	Colourless	No crimson coloration
3. Sicily sweets	0·9178	183·3	100·3	57·0	0·79	198 8	202·2	Colourless	No crimson coloration
4. Mazagan bitters	0·9180	188·6	102·5	56·5	3·1	196·8	203·1	Colourless	Slightly crimson
5. Small Indian almonds	0·91907	189·2	96·65	57·0	2·9	195·8	200·7	Colourless	Slightly crimson
6. Mogador bitters	0·9183	194·98	104·2	57·0	1·3	197·1	203·2	Colourless	No crimson coloration
7. Peach kernel oil	0·9198	191·4	95·24	57·5	3·0	196·8	205·0	Colourless at first, then pink	Deep crimson coloration
8. Apricot kernel oil	0·9200	192·4	107·4	58·0	2·3	198·0	202·0	Pink coloration	Deep crimson coloration
9. Apricot kernel oil from Mogador kernels	0·9172	198·2	107·9	57·0	2·8	194·0	200·7	Slightly pink	Less deep crimson than 8
10. Californian apricot kernel oil	0·92026	190·3	108·7	58·0	1·2	197·8	202·8	Very slightly pink	Less deep crimson than 8

It will be seen that no information of a discriminative nature can be gained from the figures contained in the foregoing tables. Recourse must therefore be had to colour reactions. Much in vogue, and in fact the only one that gives some indications, is Bieber's test. This consists in treating 5 measures of the oil with 1 measure of a mixture consisting of equal parts (by weight) of sulphuric acid, fuming nitric acid, and water.

Pure almond oil does not change colour, whereas peach kernel oil assumes a peach-blossom tint.

It is best to prepare Bieber's reagent afresh for each set of tests. It should also be noted that the colour reaction is much stronger in the case of fresh oil than with a sample which has been kept for half a year or longer.

Mixtures of almond oil and apricot kernel oil containing one-third of the latter are coloured distinctly, but mixtures containing 25 per cent. of apricot oil only slightly, so that it would be certainly somewhat hazardous to pronounce adulteration on the strength of this colour test. Peach kernel oil gives the same colour reaction, but in a much fainter degree, and only after standing for some time. It will be more risky still to judge from this test as to adulteration of a given sample of almond oil.

Maben's statements as to the differences in the elaidin tests are unfounded. Although with concentrated sulphuric acid apricot and peach kernel oils give darker colorations than almond oil, this test is perfectly useless. The same criticism holds good with regard to Maben's zinc chloride test.

Recently, phloroglucinol in $\frac{1}{10}$ per cent. ether solution in the presence of nitric acid, sp. gr. 1·45, has been proposed as a test for apricot kernel and peach kernel oils. Undoubtedly, apricot kernel oil and peach kernel oil give a distinct deep crimson coloration with the reagent, in contradistinction to some almond oils; yet some specimens of the above-described genuine almond oils show more or less strongly the same reaction. This test must therefore be employed with the utmost care. (See *Year-Book*, **1900**, 359.)

α- and β-Eucaine, Distinctive Tests for. G. Eigel. (*Apoth. Zeit.*, **18**, 603.) 10 c.c. of a 0·1 per cent. solution of α-eucaine hydrochloride gives a white precipitate with 1 drop of ammonia; solutions of cocaine hydrochloride and β-cocaine hydro-

chloride of the same strength give no precipitate. One drop of a 1 per cent. solution of *α*-eucaine hydrochloride with 1 drop of a 10 per cent. solution of potassium iodide deposits, in a few minutes, large crystals of *α*-eucaine hydriodide; solutions of cocaine hydrochloride and *β*-eucaine hydrochloride of the same strength give no precipitate. One drop of a 1 per cent. solution of *α*-eucaine hydrochloride or cocaine hydrochloride gives a white precipitate with a drop of a 5 per cent. solution of mercuric chloride. *β*-eucaine gives no precipitate.

Aluminium Succinate in Orites excelsa. H. G. Smith. (*Proc. Royal Soc. of New S. Wales*, through *Chem. News*, **88**, 315.) The occurrence of large quantities of aluminium is recorded in one of the "silky oaks," *Orites excelsa*, N.O. Proteaceae, which is plentiful in New South Wales and Queensland. A section of the tree, 3 feet in diameter, was found to contain a large deposit of basic aluminium succinate, $Al_2(C_4H_4O_4)_3Al_2O_3$. The ash of the wood furthest removed from the deposit contained 79·61 per cent. of alumina, a larger amount than has been previously recorded in any of the Cryptogams, in which alone aluminium has been supposed to occur. This specimen was exceptionally rich in the aluminium salt, but the amount of alumina in the ash of three other specimens was found to range from 36 to 43 per cent. A large proportion of the alumina was present as potassium aluminate, and as no potassium carbonate was found, it is probable that the potassium aluminate exists, as such, in the tree. In the ash of one specimen from Mullimbimby, cobalt and 3 per cent. of manganese were found, so that probably cobaltiferous manganese occurs in the district. Free normal butyric acid was found to accompany the deposit of aluminium succinate; from this the succinic acid is probably formed by oxidation, and then combines with the alumina to form the basic succinate. The ash of *Grevillea robusta*, *G. hilliana*, and *G. striata*, was found not to contain alumina. The previously recorded occurrence of alumina in the ash of these trees is probably due to the wood examined, erroneously attributed to them, being derived from *Orites excelsa*.

Andropogon Oil, Cameroon. C. Mannich. (*Berichte Pharm.*, **1903**, 86, through *Journ. Pharm. Chim.* [6], **18**, 264.) The oil is probably derived from *Andropogon citratus*, growing in the German Cameroons. It is reddish yellow in colour, and

has a lemon-like odour. Sp. gr., 0·885; it is rendered turbid by alcohol 80 per cent.; it dissolves bright in 1·5 volumes of absolute alcohol, but the addition of more causes turbidity. It contains 78 per cent. of citral.

Annatto, Colour Reaction for. L. Dokkum. (*Pharm. Weekblad*, **41**, 271.) A dilute solution of the colouring matter is floated in a test tube, on an equal volume of dilute HNO_3, so that the two solutions do not mix. In the presence of annatto the zone of contact at once shows a deep blue colour, the colour spreads into the HNO_3, which soon becomes green, and the upper aqueous layer shows a reddish turbidity.

Anthemis nobilis, Essential Oil of, Constituents of. E. E. Blaise. (*Bull. Soc. Chim.*, **29**, 327.) The acids liberated on saponification of this oil consist of angelic, and isobutylic acids, with polymerized methacrylic acid, but no tiglinic acid. Consequently that acid, as recorded by other workers, must be derived from the angelic acid present, and is not a natural constituent of the oil. The neutral constituents of the oil were isoamyl alcohol, active hexyl alcohol, anthemol, and normal butyl alcohol. Isobutyl alcohol recorded by Kœbig was not found.

Antimony Chloride Solution, Presence of Sulphates in. F. H. Alcock. (*Pharm. Journ.* [4], **17**, 809.) Attention is called to the fact that commercial "*Liquor Antim. Chlor.*" frequently contains much sulphate, 10 c.c. of one sample giving as much as 4·817 Gm. $BaSO_4$. It is stated that very little of this solution is made in strict accordance with the requirements of the B.P. 1885, and that most commercial samples do not attain the degree of sp. gr. therein required.

Antipyrine and Salophene, New Reactions for. G. M. Bérenger. (*Amer. Journ. Pharm.*, **75**, 435.) When a little antipyrine is shaken with a small quantity of solution of sodium hypochlorite, the mixture loses its odour of chlorine, and evolves in a few minutes a smell of bitter almonds. If a solution of antipyrine be treated with chlorine water, the odour of chlorine disappears in a similar manner, while an abundant white precipitate is formed.

Salophene may be readily identified by the following reaction: 1 Gm. is boiled with a dilute solution of caustic soda; after cooling, 5 c.c. of solution of sodium hypochlorite is added, when an immediate fine green colour is obtained, turning ultimately to a mahogany brown. This change of tint takes place slowly in the cold, but rapidly if the mixture be boiled. If excess of acid be added to the green or brown solution, a scarlet colour turning to orange red is produced.

Apopin Oil, a Formosan Essential Oil. K. Keimazu. (*Journ. Pharm. Soc. Jap.*, through *Schimmel's Report, Oct.*, **1903,** 10.) This oil is distilled in Formosa from a Lauraceous tree of undetermined botanical origin. It is used by the natives to mix with camphor oil, which it resembles in odour. The native name for the oil, "Shu-yu," indicates evil-smelling oil. It is a colourless clear oil, turning brown on exposure to the air. Sp. gr. 0·9279; $[\alpha]_D + 17° 19'$ to $17° 06'$. The fractions boiling between 195° and 210°C. was found to contain camphor; the higher fractions boiling above 215°C. contained eugenol, after separating which safrol was isolated by freezing. The lower boiling fractions, when refractionated, yielded cineol and depentene as well as pinene.

In a subsequent communication (*Journ. Pharm. Jap.*, **1903,** through *Schimmel's Report, May,* **1904**) the author finds that the oil contains formaldehyde, which is removed by shaking out with water, and a new alcohol, apopinol, $C_{10}H_{18}O$, in the fraction between 197–199°C., which, on oxidation, yielded citral, but which differed from linalol, giving an acetyl ester quite distinct from linalyl acetate. Apopinol has the sp. gr. 0·8942 at 18°C. and the $[\alpha]_D + 6° 4'$.

The presence of formaldehyde will serve to detect the admixture of apopin with camphor oil, since the latter does not contain that body, although acetic aldehyde is present therein.

Arnisterin, the Phytosterin of Arnica montana. T. Klobb. (*Comptes rend.*, **138,** 763.) The existence of a phytosterin in the capitula of *Anthemis nobilis* (*Year-Book,* **1903,** 34) led the author to investigate the constituents of the inflorescences of *Arnica montana.* By extracting the drug by maceration with light petroleum ether, distilling off the major part of the solvent, and further concentrating *in vacuo*, a residue was obtained which,

when treated with a large volume of acetone, and set aside to crystallize, gave a bulky deposit of crystalline scales. This proved to be the hydrocarbon identified by Boerner. This was filtered out and the acetone distilled off. The residue was saponified with alcoholic KOH, the soap dissolved in a large volume of water, and excess of KOH removed with a current of CO_2. The solution then showed a suspension of solid matter which presented the microscopical appearance of incipient crystallization. The solution was shaken out several times with ether, the solvent reduced to a small volume by distillation, and set aside. When kept at a low temperature (about 0°C.) the residue gradually formed fine hexagonal or rhombic scales and stellate needles. As the ether evaporated, its volume was replaced from time to time with absolute alcohol, and the whole set aside under a bell jar. Finally the crystals were drained, purified by re-solution in hot alcohol and contact with animal charcoal, and recrystallized. The crystalline body was still contaminated by hydrocarbons; it was further purified by re-solution in acetone, from which the hydrocarbons separated on cooling, and were filtered out; the solvent was then distilled off, and the residue extracted with a mixture of alcohol 3 and benzol 1. By slow evaporation fine flat lozenge-shaped crystals were obtained, which were arnisterin, $C_{28}H_{46}O_2$, containing 1 mol. $C_2H_5.OH$ of crystallization. During the process of extraction care was taken not to allow the temperature at any time to exceed 100°C. A further crop of crystals was obtained by working up the original mother liquor. A thick transparent coloured substance was left, soluble in most solvents, having a honey-like odour. This was the arnicin of Lebourdais, Walz, and others. When deprived of its alcohol of crystallization by heating to 115-120°C., arnisterin melts at 249–250°C. and sublimes at a higher temperature. It differs from anthesterin and other phytosterins in containing 2 molecules of oxygen. It is dextro-rotatory, $[\alpha]_D + 62{\cdot}8$. It may be benzoylated, but the benzoyl compound has not yet been obtained crystalline.

Arsenic, Delicate Biological Test for. A. E. Bell. (*Pharm. Journ.* [4]. 17, 484.) It has been observed that certain vegetable moulds, notably *Penicillium brevicaule*, possess the power of disengaging the well-known garlic-like odour when grown upon substances containing even a minute trace of arsenic.

This phenomenon can be advantageously applied in the

examination for minute traces of arsenic, which may escape detection by the usual chemical tests. For example, in some recent experiments with *Penicillium brevicaule*, arsenic was detected in a sample of malt, which when examined by Reinsch's or Gutzeit's test gave no indication of its presence.

The method adopted in applying the test was as follows: A sound potato was selected and boiled; it was then cut into several slices, placed in an ordinary Petri dish, and a small quantity of the crushed malt sprinkled over the surface of the slices. This was then sterilized at 110°C. for half an hour to destroy any accidental air organisms.

On cooling, $\frac{1}{2}$ c.c. of previously sterilized water containing spores of *Penicillium brevicaule* was poured over each slice. The whole was then kept at a temperature of 37°C. for 24 hours, when, on opening the dish, the odour of garlic was distinctly noticeable.

This method, when suitably modified, can be applied in detecting minute traces of arsenic in wall-paper, wine, beer, gas, and certain drugs.

Arsenic, Detection and Determination of Minute Traces of. A. Gautier. (*Comptes rend.*, **137,** 158.) It is found that when a ferric salt is precipitated in the presence of even a minute trace of arsenic in solution, the latter is entirely precipitated also, and may be then collected and determined quantitatively. The iron reagent to effect this is thus prepared: $FeSO_4 7H_2O$, 100 Gm., is dissolved in distilled water, 500 c.c., to which pure H_2SO_4, 25 Gm., has been added. This solution is treated with H_2S; boiled, filtered, and oxidized with arsenic-free HNO_3, 28 Gm. The solution is then precipitated with arsenic-free AmOH, the precipitate washed and dissolved, in the cold, in dilute H_2SO_4. The last traces of arsenic are then removed by digesting this acid solution, *in vacuo*, at boiling temperature, with granulated zinc free from arsenic. The solution is then reoxidized with a little pure HNO_3 and H_2SO_4, and again precipitated with an excess of pure AmOH, which removes the Zn. The precipitate is then washed and dissolved in pure dilute H_2SO_4 and diluted so that it contains 30 Gm. Fe_2O_3 in a litre.

By adding 5 c.c. of this reagent to water containing 0·001 Mgm. of As_2O_3 per litre, followed by a few drops of AmHO, and boiling, the whole of the arsenic is precipitated and the

water left absolutely arsenic free. By its means the 1 part of arsenic in 1,000,000,000 may be determined. Ordinary distilled water is found, through this reagent, generally to contain about 0·001 Mgm. of As_2O_3 per litre. Pure solution of AmOH contained 0·1 Mgm. per litre, and distinct and measurable quantities were found in many reagents and so-called pure chemicals.

Arsenic, Detection of Minute Traces in Organic Matter; Combustion in a Berthelot's Bomb. G. Bertrand. (*Annales de Chim. Analyt.*, **9**, 83.) In order to avoid the introduction of traces of arsenic with the oxidizing reagents employed to destroy organic matter in the course of a research, the device of burning the dried material in a Berthelot's calorimetric bomb in oxygen under pressure has been successfully adopted. The oxygen employed was obtained by the electrolytic decomposition of water; combustion was performed in this at a pressure of about 30 atmospheres, and was started by means of a thread of platinum wrapped round with a shred of gun cotton, prepared with arsenic-free acids. After thus ashing and cooling, the residue was washed out with water directly into the Marsh apparatus. Having first demonstrated the freedom from arsenic of pure substances, such as sugar and camphor, the method was shown to be capable of detecting an addition of 0·0005 Mgm. of As to these, before combustion. Distinct indications of arsenic in sponge, white of egg, and turtle shell, and very slight indications from thyroid gland, were thus obtained.

Arsenic, Electrolytic Method for Determining Minute Quantities of. T. E. Thorpe. (*Journ. Chem. Soc.*, **83**, 974.) A simple electrolytic method is described which dispenses with the use of zinc, and may be applied directly to organic solutions such as beer, wort, finings, etc.; it is under perfect control, gives concordant results when worked by different operators, and allows a determination of arsenic in beer to be performed in about 30 minutes. The deposits formed are more uniform in character than those obtained by the zinc and acid method, and therefore admit of more accurate quantitative comparison.

The apparatus consists of a specially constructed bottomless glass flask fitted with a ground glass stopper bearing

a $CaCl_2$ drying tube and a tapped thistle funnel. This rests with a bulged shoulder on the edge of a porous cylindrical vessel of slightly larger diameter, the two together forming the inner cell for the cathode, in which the hydrogen and hydrogen asenide are liberated on passing the current. Through the glass stopper a stout platinum wire is fused for connecting the current with the electrode. This electrode is composed of a cone-shaped sheet of platinum with several perforations, and is suspended from a hook on the end of the Pt. wire passing through the stopper, and so adjusted that when the latter is inserted the lower edge of the cone is 1 mm. above the bottom of the vessel. The cell for the anode consists of a stout glass vessel upon the flat bottom of which the porous vessel and the glass flask forming the inner cell stand. The anode consists of a band of Pt., 2 cm. broad, passing loosely round the porous cell, and connected with the current by a stout Pt. wire. The liquid in the cell should be kept below 50°C.; the whole apparatus is therefore stood in a larger dish containing water. The drying tube is packed with wool and pure anhydrous $CaCl_2$ the size of malt grains; a roll of lead acetate paper is placed at the extremity. To the exit end of the drying tube a hard glass depositing tube is fixed by means of unvulcanized rubber. This tube is composed of Jena glass, and has an external diameter of about 5 mm. and internally about 3·5 mm. After cleaning with acid, water, and alcohol, it is dried and heated in the blowpipe, so that a portion about 2 cm. long, situated 5 cm. from one end, is softened and drawn out to an uniform diameter of 2 mm. and a length of 7–8 cm. It is then cut, and the narrow end turned up at right angles. It is then supported in a horizontal position, and attached to the drying tube by resting on a cone which surrounds the flame of a small Bunsen. A piece of Pt. gauze about 2 cm. square is wrapped round it where the flame will impinge. The Bunsen has an internal diameter of 5 mm. The upper portion of the burner supports the copper cone.

This apparatus has an apparent resistance of 1·4 ohms, the potential difference between the poles being 7 volts, with a current of 5 ampères. This gives about 40 c.c. of hydrogen a minute. To reduce the intensity of the main electrical supply, which is the most convenient source of the current, a rheostat of incandescent lamps may be employed, lamps of different candle power being inserted according to the current desired;

an ammeter is included in the circuit. It is obvious that by the use of several cells a number of tests may be performed simultaneously. The H_2SO_4 solution employed is prepared by diluting one volume of pure acid with 7 volumes of water. Frothing in certain solutions under the test may be obviated by adding 1 or 2 c.c. of rectified amyl alcohol.

The apparatus is charged by pouring 30 c.c. of the acid into the anode outer cell, and 20 c.c. into the inner cathode cell. The current is then switched on and the time noted. At the end of 10 minutes the apparatus is practically free from air, and the issuing hydrogen may be lighted. At the same time the Bunsen is lighted, and the flame so regulated that the Pt. gauze is kept at a red heat. The apparatus is thus run for 15 minutes; if then no brown ring or deposit of arsenium has formed (best seen by holding a white card beneath the tube), 2 c.c. of amyl alcohol are run in, followed by the solution to be tested, and the funnel is washed with 2 c.c. of water. No air must be allowed to enter, and the stem of the funnel must be full of liquid. If arsenic be present in the added liquid, a deposit begins to form in the narrow tube in the course of a few minutes, about 1 or 2 cm. from the heated shoulder. In most cases, the whole of the arsenic will have been deposited in the tube in 30 minutes; it is then sealed up as follows: The stopper of the thistle funnel having been opened, a small pointed blowpipe-flame is directed to a spot about 3 cm. from the deposit, between it and the turned-up exit. When this end is drawn off and sealed, the current is shut off and the tube sealed at the other side of the deposit. The arsenical deposit must not be heated during this process. A short sealed tube about 4 cm. long is thus obtained, with the deposit in an atmosphere of hydrogen. This may then be compared with standard tubes prepared under similar conditions with known quantities of arsenic. The standard arsenic solution for this purpose is prepared of two strengths, one containing 0·1 Gm. in the litre or 0·0001 Gm. in the c.c.; the other by diluting this, ·01 Gm. in the litre or 0·00001 Gm. (0·01 Mgm.) in each c.c. The As_2O_3 for the first solution is dissolved by means of 1 or 2 c.c. of pure HCl, without heat, and diluted to 1,000 c.c. with water. The standard deposits are best prepared by admixture of known volumes of these solutions with extracts from arsenic-free material similar to that to be tested.

The following details of manipulation are given for certain substances:—

Malt. Whole malt may be merely washed with acid and the acid washings tested. Ground malt is washed in the presence of lime and magnesia and the solution of the ash tested. *Basic method for ground malt, hops, and hop substitutes:* 10 Gm. of the ground malt are treated with 30 c.c. of arsenic-free lime-water and heated over a small Bunsen for a few minutes. About 0·5 Gm. of arsenic-free magnesia or lime is then added, intimately mixed, and the organic matter burnt off first over the flame, then under a muffle. When cold, the ash is treated with 20 c.c. of dilute H_2SO_4, warmed and transferred to a small flask. About 0·5 of potassium metabisulphite is added and the solution boiled until free from SO_2. When cold it is ready for testing. *Acid method for whole malt:* 40 Gm. of malt are treated in a wide-mouth bottle with 40 c.c. of the dilute acid and 60 c.c. of water, and heated to 50°C., being shaken occasionally for 20 minutes. 25 c.c. of liquid, representing 10 Gm. of malt, is then decanted, and boiled as described above with potassium metabisulphite, and tested when cold.

Malt substitutes, glucose, caramel, etc.: 5 Gm. are dissolved in 20 c.c. of water, treated with 5 c.c. of the dilute acid, and metabisulphite as above.

Wort and beer may be introduced direct after being treated with the metabisulphite as described above.

Chemicals and reagents are tested in a similar manner, after being treated with the metabisulphite reducing agent.

Care must be taken that the hook carrying the Pt. cathode is effectually closed and contact complete, or there may be danger of sparking, which, in the presence of air, might cause an explosion.

The cathode should be kept polished; after a time it becomes coated with a deposit which may retain arsenic. After polishing it should be worked for half an hour as a blank test before performing another series of determinations. The porous cylinder requires occasional roasting in a muffle, especially after prolonged use with black beers or caramel.

Arsenic, Electrolytic Estimation of Minute Quantities of. H. J. S. Sand and J. E. Hackford. (*Proc. Chem. Soc.*, **20,** 123.) The use of lead electrodes instead of platinum is recommended, errors due to the presence of foreign metals being rectified by the addition of lead acetate or zinc sulphate to the

electrolyte except when the foreign metal is mercury. A high supertension of the cathode is requisite for the reduction of arsenic acid; platinum having a low supertension is quite inefficient. When lead and zinc cathodes are used, the smallest amount of arsenic which can be detected in alkaline solutions of arsenates or arsenites is about 30 times as great as in acid solutions, but platinum cathodes are quite unsuitable.

Arsenic Tri-iodide, Method of Preparation. R. Dupuoy. (*Journ. Pharm. Chim.* [6], **19,** 311, after *Bull. Soc. Pharm. de Bordeaux.*) Arsenious oxide, 20 Gm., is dissolved on the water-bath in 200 c.c. of strong HCl. When solution is complete a solution of KI, 10 Gm., in water, 100 c.c., is poured in. A fine red precipitate of AsI_3 is immediately formed. The flask is kept immersed in boiling water for 15 minutes and the precipitate is then collected in a funnel blocked with a pad of absorbent cotton, or, better still, of glass wool. After thorough draining, the precipitate is dissolved in CS_2, in which the accompanying KCl is perfectly insoluble. The solution is set aside in a free current of air protected from direct sunlight. As the CS_2 evaporates, the AsI_3 is deposited in fine ruby-red crystals. It is very pure, titrating 99·8–99·9 per cent. as compared with 72·34, 77·23, 85·62 and 89·11 obtained from commercial samples. (See also *Year-Book*, **1901,** 39.)

Arsenious Iodide, Volumetric Determination of. W. Duncan. (*Pharm. Journ.* [4], **18,** 8.) This salt was for the first time included in the 1885 Pharmacopœia, chiefly for preparing the then official Donovan's Solution. Beyond a short description as to colour, crystalline structure, and solubility, little was said in the monograph, and no quantitative test as to purity was given. Although Dott, in 1893 (*Year-Book*, **1893,** 28), drew attention to the varying quality of commercial samples, no addition has been made to the "Characters and Tests" in the subsequent edition of the official work.

As it is necessary for the correct compounding of Donovan's Solution that arsenious iodine be strictly AsI_3, it may be useful to point out that the purity of the salt can be quickly determined by a volumetric process.

When the salt is added to water, dissociation into arsenious oxide and hydriodic acid begins, and proceeds until an

equilibrium is produced, in accordance with the reversible equation :—

$$2AsI_3 + 3H_2O \rightleftharpoons As_2O_3 + 6HI.$$

If the hydriodic acid be removed out of the sphere of action by addition of alkali, hydrolysis proceeds till all the salt is decomposed, and a solution of arsenious oxide and alkali iodide results. Titration of the former thus becomes possible according to the following equation :—

$$2AsI_3 + 5H_2O + 2I_2 = As_2O_5 + 10HI.$$

That is, 1 c.c. of an N/10 iodine solution equals 0·02261 Gm. AsI_3.

A weighed quantity of the salt should be dissolved in an aqueous solution of sodium or potassium bicarbonate, and the iodine run in till oxidation is complete.

The variations in the commercial salt may sometimes be due to unskilful manufacture, especially when metal arsenium is used ; it is chiefly, however, due to faulty storage.

Artemisia vulgaris, Japanese, Essential Oil of. (*Schimmel's Report, Oct.*, 1903, 78.) The oil distilled from Japanese *Artemisia vulgaris*, known as Yomugi oil, has a powerful cineol-like odour. Sp. gr., 0·9101 ; $[\alpha]_D = 13° 16'$; acid number, 1·56 ; ester number, 29·81. It is not completely soluble in alcohol. It contains cineol.

Aspidium athamanticum (Panna root). A. Anton. (*Journ. Pharm. Chim.* [6], 18, 497.) Panna root, the rhizome of the African fern *Aspidium athamanticum*, is a tænifuge of great value ; although it has long been known, it has been neglected, notwithstanding that it is superior in action to other more widely used drugs. It occurs in pieces 8–13 cm. in length, and 2–5 cm. in diameter ; reddish brown in colour and covered with root fibres and scales. Illustrations are given representing both the microscopical characters and the microscopical structure of the drug.

Chemical analysis showed that the root contains about 3·3 per cent. of fatty oil ; 8·5 per cent. of resin ; 2·75 per cent. of tannin, with 2·1 per cent. of colouring matters.

The resin is separable into two parts, one soluble in ether, the

other insoluble. The ether soluble residue, after purification by precipitation from alcoholic solution by water, re-solution in alcohol, and treatment with animal charcoal, gives reddish yellow rectangular prisms of *pannic acid*, $C_{12}H_{12}O_4$. When oxidized by nitric acid this yields phthalic and benzoic acids.

The dose of the powdered root is about 180 grains, divided into 3 powders each of 60 grains, which are to be taken every five minutes, fasting. A quarter of an hour after the last powder, a dose of castor oil is to be given. For children, from 7 to 14 years, each powder consists only of 15 grains, which is taken as prescribed above. The ethereal or alcoholic extracts of panna have not the same activity as the powdered rhizome. The drug should be freshly powdered.

Aspidium spinulosum, Constituents of the Fixed Oil of. P. Farup. (*Archiv der Pharm.*, **242,** 17.) The fatty oil of *Aspidium spinulosum* consists of the glycerol esters of oleic and linoleic acids, and probably also of isolinoleic acid. It also contains a small amount of the esters of solid fatty acids, as well as phytosterin. This last was not found by Katz in the fatty oil of male fern. (See also *Year-Books*, **1900,** 191; **1903,** 188.)

Aucubin, Further Notes on. E. Bourquelot and H. Hérissey. (*Journ. Pharm. Chim.* [6], **19,** 464.) This glucoside, the method of preparation of which has been given previously (*Year-Book*, **1902,** 39), is soluble in water, sparingly dissolved by alcohol 95 per cent., more soluble in 85 per cent. alcohol. It contains 5·6–5·9 per cent. of H_2O of crystallization, which is not entirely given up until it is heated to 115–120°C. Its molecular weight is 304–308, as shown by cryoscopic determinations, and its formula $C_{13}H_{18}O_8 + H_2O$. It is hydrolized by dilute acids even in the cold, forming dextrose and a brown substance, *aucubigenin*. Aucubin occurs in notable quantities in the leaves, stem and root of *Aucuba japonica*. In the leaves it is accompanied by emulsin.

Barringtonia speciosa, Constituents of. W. P. H. van den Driessen-Mareeuw. (*Pharm. Weekblad*, **40,** 729.) The seeds of *Barringtonia* are used in India as a fish poison. After removing fatty matter with petroleum ether, ether extracted gallic acid and a crystalline principle, *barringtogenitin*

$C_{15}H_{24}(OH)_3$, in colourless needles, m.p. 179-180°C. It is insoluble in water. Extraction with alcohol and water then gave the glucoside *barringtonin*, $C_{18}H_{25}O_7(OH)_3$, a white amorphous body resembling saponin. When hydrolized with dilute mineral acids, this forms a sugar and *barringtogenin*, $C_{10}H_{16}O_3$.

Ben Oil, Characters of. J. Lewkowitsch. (*Analyst*, **28**, 343.) A genuine sample derived from *Moringa pterygosperma s. oleifera*, supplied by the Jamaica Section of the Imperial Institute, was examined

The chief interest in this oil depends on its low iodine value; this explains why it is specially applicable for lubricating watch-springs and other delicate machinery. The following properties were determined: Sp. gr. at 15°C. (water at 15°C.=1), 0·91267; iodine value, 72·2; iodine value of the liquid fatty acids, 97·53; refraction (butyro-refractometer), 50·0°.

Two other specimens of ben oil, one of which represented the solid portion of ben oil filtered out at 0°C., and the other the liquid portion, were examined. The following characteristics were determined:—

	Portion Solid at 0°C.	Freed from solid at 0°C.
Specific gravity at 15°C. (water at 15°C.=1)	0·91840	0·91998
Iodine value	109·9	111·8
Refraction in the butyro-refractometer	59·0°	60·5°

A commercial sample of ben oil had the refraction 59° in the butyro-refractometer, and the iodine value, 112·6. Evidently this also represented a filtered oil. The difference between the genuine sample from Jamaica and the other oils is noteworthy.

Benzoin, Compound Tincture of, Determination of Total Solids in. E. Dowzard. (*Chem. and Drugg.*, **64**, 327.) The determination of the total solids in compound tincture of benzoin by drying at 100°C. gives very erroneous results, owing to the volatile nature of the benzoic acid present; the cinnamic acid is also slightly volatile, but not to the same extent. Owing to this fact, the residue must be heated for many hours before a constant weight is attained. The benzoic and cinnamic acids are part of the total solids, and most important constituents of the tincture; they should therefore be fixed by

chemical means before drying. If a small quantity of MgO is added to the tincture before driving off the alcohol, non-volatile salts are formed, and constant results are obtained after a few hours' drying; the slight loss of water owing to the formation of magnesium compounds may be ignored. The determination is best carried out as follows :—

Into a tared flat-bottomed basin, measure 2 c.c. of the sample; to this add 0·1 Gm. of recently ignited MgO in fine powder; work the mixture into a smooth condition with a small glass rod, which should be weighed with the basin. After allowing the mixture to stand for about 15 minutes, the alcohol is slowly driven off, stirring continually. The basin is then placed in a water-oven, and its contents dried at 99–100°C. for 4 or 5 hours in a partial vacuum. Before taking out of the oven, a cap of filter-paper perforated with small holes should be placed over the basin, as crepitation occurs on cooling. If after the first weighing a further drying is considered necessary, the perforated cap should be put over the basin, before it is placed in the oven, and should not be removed until the moment before weighing; if this precaution is not taken a slight loss may occur. The weight of magnesium oxide used must of course be subtracted from the result.

The following results were obtained in the examination of a small experimental batch of this tincture, made strictly according to the B.P. The figures obtained show how incorrect the results are likely to be if the acids are not fixed :—

2 c.c. of tincture + 0·1 Gm. MgO. Extractive per 100 c.c.	After drying at 99–100°C. in a partial vacuum for	2 c.c. of tincture without MgO. Extractive per 100 c.c.
19·62 Gm.	4 hours	18·60 Gm.
19·60 ,,	6 ,,	18·30 ,,
—	8 ,,	18·05 ,,
—	10 ,,	17·85 ,,
—	12 ,,	17·74 ,,
—	14 ,,	17·65 ,,
—	16 ,,	17·55 ,,
—	18 ,,	17·43 ,,
—	20 ,,	17·34 ,,

A large batch of this tincture, made on the manufacturing scale, was found to contain 19·4 Gm. of extractive per 100 c.c. when tested by the above method, using magnesium oxide as a fixing agent. If the extractive from compound tincture of benzoin is dried to a constant weight at 100°C., the results

will be from 2 per cent. to 2·5 per cent. below the actual amount of total solids present. (See *Year-Book*, **1901,** 179, 388.)

Benzonaphthol, Detection of Free Naphthol in. A. Jorissen. (*Répertoire* [3], **15,** 365.) The following test is given to detect β-naphthol, which is likely to occur as an impurity in benzonaphthol. Twenty Cgm. of the benzonaphthol to be tested is added to 2 c.c. of glacial acetic acid, followed by 2 drops of citric acid solution. Pure benzonaphthol remains colourless. If β-naphthol be present the mixture acquires a yellow tint.

Bismuth, Colorimetric Determination of. P. Planés. (*Journ. Pharm. Chim.* [6], **18,** 387.) The method is based on the use of glycerin to prevent the precipitation of BiI_3 when solutions of the metal in its presence are treated with KI. The resulting clear yellow solution varies in intensity of colour with the amount of bismuth present; the depth of tint may be matched colorimetrically with a standard solution of bismuth nitrate in glycerin similarly treated with KI. A standard 1 : 100 solution of pure bismuth is thus prepared. Commercial metallic bismuth is dissolved in HNO_3, the solution decanted from any insoluble matter, and precipitated with AmOH, the aqueous portion decanted, and the precipitate then treated with 2 per cent. NaOH solution, which removes any As or Pb. After collecting and washing, the precipitate is dissolved in HNO_3 and reprecipitated by pouring into water. The resulting subnitrate is collected, washed, dried and reduced by heating with charcoal. The resulting button of pure bismuth is used for the preparation of the standard solution. One Gm. is exactly weighed off and dissolved in 3 c.c. of HNO_3 (sp. gr., 1·39) and 2·8 c.c. of water. When complete solution is attained, the mixture is made up to 100 c.c. with glycerin. This solution is stable. The solution of KI is made with 5 Gm. of the pure salt in 100 c.c. of water. The determination is conducted as follows: Ten c.c. of the standard bismuth solution is introduced into a graduated 50 c.c. flask, treated with 10 c.c. of the KI solution, and made up to 50 c.c. with a mixture of equal parts of glycerin and water. A known weight of the bismuth salt (for instance, 0·15 Gm. of subnitrate) is dissolved in sufficient HNO_3 and water in a similar flask, treated with 10 c.c. of glycerin, 10 c.c. of the KI solution, and made up to 50 c.c.

with a similar mixture of glycerin and water. The depth of tint is then either compared by means of a colorimeter or adjusted by comparison in tubes, as in "Nesslerizing." The salt or substance containing bismuth should always be converted into the form of nitrate by dissolving in HNO_3 as above indicated.

Bismuth Lactate, Method of Preparation. (*Supplement to the Dutch Pharmacopœia*, **1902,** 135.) Six parts of bismuth subnitrate are treated in a flask with a mixture of 5 parts of solution of ammonia and 10 parts of water. After standing, the supernatant liquid is decanted, and the precipitate washed. Five parts of lactic acid are then added, and the resulting solution filtered into 10 parts of alcohol. The precipitate thus thrown down is collected and dried. Bismuth lactate is required, when incinerated with $AmNO_3$, to leave a residue of 55–59 per cent. of bismuth oxide.

Bismuth Phthalate and Mellate; and Pyrophoric Bismuth. P. Thibault. (*Bull. Soc. Chim.*, **31,** 135.) *Bismuth phthalate*, $2\left\{Bi_2\left(C_6H_4\begin{matrix}CO_2\\CO_2\end{matrix}\right)3\right\}Bi_2O_3$, occurs in fine white needles, decomposed by water, insoluble in ordinary solvents, which neither melts nor decomposes when heated to 300°C. It is obtained by boiling anhydrous bismuth oxide with excess of orthophthalic acid for 10 or 12 hours in the presence of water, until all microscopic yellow crystals of the oxide have disappeared. The precipitate is then filtered out, washed with alcohol or ether-alcohol and dried.

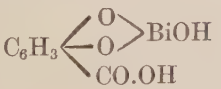
Bismuth mellate, $C_6(CO_2)_6Bi_2$, is obtained by the action of hot mellitic acid in fairly concentrated solution on both hydrated and anhydrous bismuth oxide. It forms white acicular crystals, which are not decomposed by water even on boiling, and is insoluble in most solvents. On heating the salt to 350°C. in a vacuous sealed tube a black mixture of carbon and finely divided bismuth is obtained, which, when thrown into the air, takes fire spontaneously, with the formation of yellow fumes of Bi_2O_3.

Bismuth Salicylate, Test for Salicylic Acid in. William Lyon. (*Pharm. Journ.* [4], **18,** 219.) It has been frequently shown by investigators that the official test for this

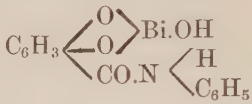
impurity is unreliable, since the alcohol exerts a decomposing action upon the bismuth salicylate, thus giving a reaction with ferric chloride, indicating the presence of free salicylic acid when such does not exist in the sample.

Benzol, 90 per cent. is found to be a satisfactory solvent for this purpose. A little of the salicylate to be tested is placed in a thick filter over a test glass containing a little 1 : 3000 Fe_2Cl_6 solution. Benzol is then allowed to percolate through the powder and to fall on the reagent. In the presence of free salicylic acid a fine colour reaction will be obtained at the zone of contact. (See *Year-Books*, **1900,** 325; **1901,** 437; **1902,** 45.)

Bismutho-Protocatechuic Acid. P. Thibault. (*Bull. Soc. Chim.*, **31,** 176.) Bismutho-protocatechuic acid, $C_7H_5O_5Bi$, is readily obtained by the action of aqueous solution of protocatechuic acid on hydrated on anhydrous bismuth oxide. With the former, reaction takes place rapidly at ordinary temperatures; with the latter, prolonged boiling is requisite to complete the reaction, and there is some decomposition. Bismutho-protocatechuic acid is a lemon yellow crystalline powder formed of minute pyramids often united at the base or joined in a stellate form. It is insoluble in water, alcohol, neutral solvents and cold acetic acid; it dissolves readily in mineral acids, boiling acetic acid, alkalies and alkaline carbonates. In the presence of water it has an acid reaction on blue litmus. With dilute Fe_2Cl_6 solution it slowly develops a green colour, ultimately becoming blue. When precipitated from alkaline solutions by means of alcohol, one molecule of the alkali is found to be combined, the sodium salt having the formula $C_7H_4O_5BiNa$, that of potassium $C_7H_4O_5BiK$, and that of ammonium $C_7H_4O_5(NH_4)$. Since only one atom of alkali is thus fixed even in the presence of excess, it is evident that the bismuth occupies the place of two atoms of hydrogen in the phenol group; for if it were otherwise combined, the action of alkali would cause separation of Bi; for the same reason, the reaction with Fe_2Cl_6 is not immediate, but progressive, as Bi is replaced slowly by Fe. The formula of bismutho-protocatechuic acid must therefore be written—



The presence of the carboxyl is rendered more evident by the action of aniline with the acid, the anilide



being formed after prolonged boiling of that base with the acid.

Boldo Leaves, Essential Oil of. E. Tardy. (*Journ. Pharm. Chim.* [6], **19**, 132.) The dried leaves of *Boldoa fragrans* yielded slightly under 2 per cent. of a yellowish-green oil, having a hyssop-like odour when observed in bulk, but more that of hyacinth or lily of the valley if allowed to evaporate from paper. It has the sp. gr. 0·876, and the $[a]_D - 6° 30'$. It contains a small amount of phenol, probably eugenol, cuminic aldehyde, acetic acid as ester, a divalent dextro-terpene, a tetravalent lævo-terpene; and a lævo-sesquiterpene which may possibly be a decomposition product.

Brandy, Method for Analysis of, Employed in the Paris Municipal Laboratory. (*Journ. Pharm. Chim.* [6], **19**, 484, 533.) Following an able summary of the sources of genuine wine-brandy and commercial alcohol, the constituents of both, and the relative toxicity of their constituents, the following scheme of analysis is given:—

Sp. gr. Determined with the alcoholimeter and with the official tables.

Dry Extractive. Twenty-five c.c. of the sample is evaporated to dryness at 100°C. and weighed. *Sugar* is determined in the dry extractive by means of titration with Fehling's solution; the nature of the *colouring matter* is found with a portion of the aqueous solution of the extractive. It should be wholly tannin matter; generally some caramel is present; sometimes a complex coal-tar colour is found.

Determination of Alcohol. Two hundred c.c. is distilled in the usual manner, after the addition of 20 c.c. of water, used to wash the measuring vessel, and 200 c.c. is distilled off. The alcoholic strength is then determined by means of the official alcoholimeter. This distillate is then available for the determination of aldehydes, furfural, and the higher esters and alcohols.

Acidity. Twenty-five c.c. is titrated directly with N/10 KOH

solution, and the results are expressed in Mgm. $HC_2H_3O_2$ per litre.

Aldehydes. The distillate of the determination of alcohol is adjusted to exactly 50 per cent. by volume alcoholic strength, either by adding more pure alcohol or water. The determination is made by means of a rosaniline bisulphite solution prepared as follows: Distilled water, 1,000; sodium bisulphite solution, sp. gr. 1·3082, 100; solution of fuchsine 1 : 1,000, 150; sulphuric acid, 15. The test is made colorimetrically, the depth of tint being matched with the requisite volume of a solution of 0·05 Gm. acetic aldehyde in 1 litre of alcohol 50 per cent., with the same reagent, by means of a Duboscq colorimeter. The results are expressed in millegrammes of acetaldehyde per litre, and corrected by the experimental curves determined by Cuniasse.

Furfural. This is determined colorimetrically with aniline acetate, using 10 c.c. of the distillate brought to 50 per cent. by volume of alcohol. The standard solution of furfural for comparison contains exactly 0·005 Gm. furfural in a litre of alcohol 50 per cent.

Esters. Fifty c.c. of the above distillate, rendered neutral, is saponified with 10 c.c. of alcoholic N/10 KOH solution by boiling under a reflux condenser for one hour. After cooling, the uncombined alkali is titrated back in the usual manner with N/10 H_2SO_4. The number of c.c. of combined alkali thus found $\times 0{\cdot}176$ gives the ethers expressed as acetic ether in 1 litre of the alcohol.

Higher Alcohols. Fifty c.c. of the first distillate, adjusted to 50 per cent. by volume of alcohol, is treated with 1 Gm. of metaphenylene-diamine hydrochloride, to fix the aldehydes, the mixture being heated for an hour under a reflux condenser. Exactly 50 c.c. is then distilled off. Ten c.c. of this alcohol is then mixed with 10 c.c. of perfectly colourless monohydrated H_2SO_4. The same mixture is made, under the same conditions, with a standard solution of isobutyl alcohol, 0·5 Gm. in 1 litre of alcohol 50 per cent. After cooling, the colour is measured in the two solutions by the colorimeter, and the results expressed in terms of isobutyl alcohol per litre, corrected, as in the case of the aldehydes, by reference to the curves worked out experimentally by Cuniasse.

Co-efficients of Impurities or of Bouquet. When each group of impurity has been determined and calculated into millegrammes per litre of the alcohol at its original strength, all the

figures thus expressed are calculated into percentages, by volume of absolute alcohol. The sum of these is termed the co-efficient of impurities or the non-alcoholic constituents of the sample. Tables of results obtained with commercial alcohols, genuine brandies and cognacs are given.

Cajuput Oil. John C. Umney. (*Chem. and Drugg.*, **63**, 725.) The specific gravity of cajuput oil, as met with at present in commerce, is lower than was the case some years back. Recent samples have been met with with the sp. gr. 0·919. During the recent (October, 1903) scarcity of cajuput oil many sophisticated samples were met with, eucalyptus oil being the adulterant most often employed, but in some instances petroleum products were added. It is noted that the fall in specific gravity in recently imported oils is accompanied by a corresponding lower cineol content. It is suggested that the limits of specific gravity should be wider than those at present given in the B.P. monograph, namely, 0·922–0·930, the figures 0·919–930 being put forward as covering genuine oils as met with at the present time. (See *Year-Books*, **1888**, 363; **1889**, 185; **1890**, 208; **1895**, 166.)

Cajuput Oil, South Australian. (*Schimmel's Report, May*, **1904**, 97.) Three specimens of South Australian cajuput oil have been examined, the botanical sources of which are unknown. These had the following characters:—

"*Cajuput Oil, Blanc.*" Sp. gr. at 15°C., 0·8908: $[\alpha]_D + 8° 8'$; solubility in alcohol 90 per cent., 2 : 1; the oil is colourless, has a piperaceous odour and probably contains cymol.

"*Cajuput Oil, Vert.*" Sp. gr. at 15°C., 0·8727; $[\alpha]_D + 32° 40'$; solubility in alcohol 90 per cent., 1 : 5; contains cineol and has the odour of a mixture of that body with amyl alcohol. The blue colour is due to copper.

Cajuput Oil, Larges Feuilles. Sp. gr. at 15°C., 0·8854; $[\alpha]_D + 9° 7'$; solubility in alcohol 70 per cent., 1 : 25. The oil has a pleasant coriander-like odour, and probably contains linalol.

Calumba Root, Essential Oil of. (*Haensel's Report, Jan.*, **1904.**) Calumba root yields a trace, 0·00568 per cent., of volatile oil, having a dark brown colour; sp. gr., 0·9307; optically inactive; acid value, 24; saponification value, 54. It dissolves readily in alcohol 96 per cent., but separates a brown flocculent substance with 80 per cent. alcohol.

Calyptranthes paniculata, Essential Oil of. (*Schimmel's*

Report, May, **1904,** 95.) This oil, received from Porto Rico under the name of "May oil," had the following characters. In general, it resembles lemon-grass oil: Sp. gr., 0·9509; $[a]_D - 1° 52'$; citral content, 62·5 per cent.; readily soluble in alcohol 80 per cent.; incompletely so in alcohol 70 per cent.

Camphor, Artificial, the Manufacture of. A. Collins. (*Scientif. Amer.*, through *Pharm. Journ.* [4], **188.**) Oil of turpentine weighing at least 2,000 lb. is placed in steam-jacketed reaction-tanks together with anhydrous oxalic acid, the result of this reaction being pinyl oxalate and pinyl formate. After the completion of this step in the process, the liquid is pumped into a set of stills for treatment. Here it is distilled with live steam in the presence of an alkali, ordinary camphor and borneol camphor being formed and dissolved in the oily products of the reaction. These oils are fractionated, to extract the camphor and borneol. After the pleasant-smelling oils have passed over, the camphor and borneol distil in the steam and are precipitated in the condenser in a white mass somewhat resembling boiled rice. The crude product is then forced by compressed air through a filter press, and thoroughly washed to free it from all traces of oil, when it is dropped into an oxidizing tank, where the borneol oxidizes into ordinary camphor.

The mass is transferred to a centrifugal machine, where the oxidizing liquors are thrown out, and the camphor remains behind, comparatively pure, but stained from the oxidizing compound, so that it resembles light-brown sugar. After removal from the separator it is placed in a large steam-jacketed sublimer. In this vessel a slow heat frees it from any water it may contain, and the temperature is then raised to the boiling point of camphor, while a rapid current of air projected over the surface of the pan, blowing the camphor into a condensing chamber, where it settles in the form of snowflake-like crystals.

The subliming pan and its condensing chamber are so arranged that from the time the charge of crude camphor is introduced until the pure sublimate is obtained it is untouched by hand and is transferred mechanically into paper-lined barrels, thus insuring absolute freedom from dust or any extraneous matter or impurities. The yield of camphor by this process is from 25 to 30 per cent. of the weight of turpentine used. The process takes about 15 hours.

Camphor Oil, Confirmation of the Presence of Terpineol, Camphene and Cineol in. (*Schimmel's Report, Oct.*, **1903,** 15.) The presence of terpineol in camphor oil is confirmed. The lower boiling fractions of the oil were refractionated two or three times *in vacuo*, and the portion boiling between 98-103°C. at 10 mm. pressure were treated with alcoholic solution of hydroxylamine. After removing the alcohol, the oil which had not combined was separated by steam distillation from the camphor oxime formed. By repeated fractionation of this oil fractions were obtained which yielded crystals when cooled; these, when recrystallized from alcohol, had the characters of lævo-terpineol.

The presence of camphene was demonstrated in the fractions of light camphor oil boiling between 161–164°C., which, when esterified with sulphuric and acetic acid, gave isobornyl acetate, which, when saponified, gave borneol; this was reconverted into camphene by means of zinc chloride, in benzene solution. Another portion of the borneol, when oxidized with chromic acid in glacial acetic acid, yielded camphor m.p. 118°C.

Cineol was also detected in the fractions boiling at about 170°C. by means of Hirschsohn's iodol reaction. It had previously been isolated by the hydrobromic acid method.

Camphor, Essential Oil of; Presence of Borneol in. (*Schimmel's Report, May*, **1904.**) From the fraction of camphor oil boiling between 210-222°C. borneol has been isolated as its phthalic anhydride compound. (For other constituents of camphor oil, see *Year-Book*, **1903,** 50.)

Casimiroa edulis. W. Bickern. (*Archiv der Pharm.*, **241,** 166.) Under the name "*Zapote blancho*," or "*Matu sano*" the fruit of *Casimiroa edulis* is largely eaten in Central America on account of the delicious flavour of the pulp, which is also reputed to possess soporific effects. The fruit is included in the Mexican Pharmacopœia as an anthelmintic, and the kernels of the seeds are used as dressings for wounds. In 1903 Sanchez indicated the presence of an alkaloid in the fruit. Other investigations stated that the active principle was a glucoside. The author has isolated the crystalline alkaloidal glucoside casimirose, $C_{30}H_{32}N_2O_5$, which is very soluble in water and in alcohol, sparingly soluble in ether. It is readily hydrolized, forming a dextro-rotatory sugar. The seeds contain 0·6 per cent. and

the fruits 0·9 per cent. of this body; the former contain, as well as a phytosterol, casimirol, $C_{27}H_{18}O_2$, which melts at 207°C.

Cassia Oil, Essential, Test for Rosin in. (*Schimmel's Report, May,* **1904,** 19.) Sophistication with small quantities of rosin still continues. This may be detected by treating an alcoholic solution of the oil 1 : 3 with freshly prepared alcoholic solution of lead acetate. Pure cassia oil gives no precipitate, but in the presence of rosin a considerable amount of insoluble lead compound is formed. The oils examined showed a fair proportion of cinnamic aldehyde, but a distillation residue in excess of 11 per cent., the limit for normal cassia oil.

Cassie, Essential Oil of, Synthetic. (*Schimmel's Report, May,* **1904,** 23.) Schimmels have patented the use of the following articles for the preparation of synthetic cassie oil: Linalol, geraniol, terpineol, ionone, irone; cuminic, decyclic, anisic, nonylic and octylic aldehydes; benzyl alcohol, methyl salicylate, benzaldehyde, eugenol and eugenol methyl ester.

Chamomile Oil, Angelic and Tiglinic Acid in. E. E. Blaise. (*Chem. Centr.* [1], **1903,** 1226.) Essential oil of chamomile is a useful source of these two acids. To isolate angelic acid, 50 Gm. of the oil of Roman chamomile is shaken up with caustic potash, 50 Gm., water, 50 Gm., and wood spirit, 60 Gm. After standing for several hours, the mixture becomes homogeneous. The wood spirit is then distilled off *in vacuo*, water added to the residue, the oily supernatant layer removed, the aqueous portion shaken out with ether, and, after removing the ethereal layer, decomposed with a slight excess of sulphuric acid. The liberated acids are shaken out with ether, the solvent evaporated, and the residue cooled to 0°C., when a part of the angelic acid crystallizes out. The mother liquor, after separating these crystals, is fractionated *in vacuo*, and the portion distilling above 70°C. is again cooled, when more crystals are obtained. The fluid portion is then esterified with alcohol and sulphuric acid, and the mixed esters, consisting chiefly of isobutyric and angelic ethyl esters, fractionated under normal pressure; the angelic ester thus separated is again saponified, and its acid subsequently liberated by sulphuric acid and removed by shaking out with ether. Tiglinic acid was not formed by this process, but was liberated from α-methyl-β-oxybutyric acid by dehydration, this methyl ester being obtained from a polymethyl-arkyl com-

pound, which occurred as a white powder. The ethyl ester of this was treated with phosphorus pentachloride, then saponified, when tiglinic acid and a little angelic acid were obtained. 500 Gm. of oil gave 90 Gm. of angelic acid, 25 Gm. of isobutyric acid, and a larger yield of the polymethyl-arkyl acid. The neutral compounds isolated from the same amount of oil comprised 30 Gm. of normal butyl alcohol, 25 Gm. of iso-amyl alcohol, 80 Gm. of active hexyl alcohol, 33 Gm. of anthemol, and 5 Gm. of a white insoluble powder. Isobutyl alcohol found by Koebig in the oil was not met with.

Chaulmoogra Oil, Characters of. E. Hirschsohn. (*Pharm. Centr.*, **44**, 627.) Three pure and four commercial specimens gave the following figures:—

—	Acid No.	Saponification No.	Iodine No.
Pure	26·84	205·5	99·5
Pure	25·54	210	96·8
Pure	21·14	198·9	98·4
Commercial	87·33	253	69·7
Commercial	34·44	95·6	33·9
Commercial	70·56	207·1	88
Commercial	37·60	198·4	96·1

Chaulmoogra Seeds, Constituents of. F. B. Power and F. H. Gornall. (*Proc. Chem. Soc.*, **20**, 135.) The seeds which yield the chaulmoogra oil of commerce are derived from *Taraktogenos kurzii* (King), a native of Burmah, and not, as has until quite recently been assumed, from *Gynocardia odorata* (R.Br.) The oil has previously been examined by Moss (*Year-Book*, **1879**, 523–533), Petit (*Journ. Pharm. Chem.* [6], **24**, 445), and more recently by Schindelmeiser (*Ber. Deutsch. Pharm. Ges.*, **14**, 164), but their results differ in many respects from those obtained by the present authors, which are as follows:—

The seeds of *Taraktogenos Kurzii* (King) contain a hydrolytic enzyme, and also an unstable cyanogen compound, which reacts with the enzyme when the seeds are crushed, giving rise to hydrogen cyanide.

On expression, the seeds yielded 30·9 per cent. of a fatty oil, which had the following constants:—m.p. 22–23°C.; sp. gr. 0·951 at 25° and 0·940 at 45°; $[\alpha]_D$ 15° +52°; acid value 23·9; saponification value, 213; iodine value, 103·2.

On hydrolysis, the fatty oil yielded glycerol, a very small amount of phytosterol, $C_{26}H_{43}.OH$ (m.p. 132°), and a mixture of fatty acids (m.p. 44–45°; $[\alpha]_D + 52{\cdot}6°$ in chloroform; acid value, 215; iodine value, 103·2), which consisted chiefly of several homologous acids belonging to a series $C_nH_{2n-4}O_2$ containing a closed ring and one ethylenic linkage, no member of which has hitherto been isolated from a fatty oil. The highest of these homologues present, which was isolated in a pure condition, separates from most of the usual organic solvents in glistening leaflets (m.p. 68°; b.p. 247–248°/20 mm., $[\alpha]_D + 56°$), has the formula $C_{18}H_{32}O_2$, and is designated *chaulmoogric acid*. It combines with only two atomic proportions of bromine or iodine. Palmitic acid also was identified, and there is reason for assuming the presence of a near homologue or homologues of chaulmoogric acid, but belonging to the series having the general formula $C_nH_{2n-4}O_2$ with two ethylenic linkages. Undecylic acid and hydroxy-acids were proved to be absent, and an individual acid corresponding with hypogæic acid could not be isolated. The "gynocardic acid" of all previous investigators is believed to be a mixture of several substances.

The "press-cake" yielded, besides formic and acetic acids and a very small amount of volatile esters having the characteristic odour of the seeds, an appreciable amount of a neutral oily substance, $C_{18}H_{32}O_2$ (b.p. 214–215°/18 mm., sp. gr. 0·9066 at 16/16°, $[\alpha]_D + 42{\cdot}4°$), which is isomeric with chaulmoogric acid; this substance is being further investigated, as are also the seeds of *Gynocardia odorata* (R.Br.).

Chaulmoogric Acid, the Constitution of. F. B. Power and F. H. Gornall. (*Proc. Chem. Soc.*, **20,** 136.) With the object of ultimately determining the constitution of *chaulmoogric acid*, $C_{18}H_{32}O_2$, a number of its derivatives have been prepared and studied.

Methyl chaulmoograte, $C_{17}H_{31}.CO_2Me$ (m.p. 22°, b.p. 227° corr./20 mm., sp. gr. 0·9119 at 25°/25°C., $[\ ]_D$ 15°C. + 50°, in chloroform), was prepared by the interaction of the acid, methyl alcohol, and hydrogen chloride. *Ethyl chaulmoograte*, $C_{17}H_{31}CO_2Et$, a colourless oil (b.p. 230° corr./20 mm., sp. gr. 0·9079 at 15°/16°C., $[\alpha]_D$ 20°C. + 50·7°), was prepared in like manner. *Chaulmoogramide*, $C_{17}H_{31}.CO.NH_2$ (m.p. 106°C., $[\alpha]_D$ 27°C. + 57·3° in chloroform), was obtained according to Aschan's method (*Berichte*, **31,** 2344). *Bromodihydrochaulmoogric acid*, $C_{17}H_{32}Br.CO_2H$

(m.p. 36–38°C.; optically inactive), is formed when chaulmoogric acid is treated with hydrogen bromide in glacial acetic acid.

Ethyl chaulmoograte absorbs two atomic proportions of bromine in the cold, forming *ethyl dibromo-dihydro-chaulmoograte*, $C_{17}H_{31}Br_2{\cdot}CO_2Et$, which is an oil.

When chaulmoogric acid is treated with sodium in boiling amyl alcohol, the ethylenic linkage is not resolved, but there were obtained, after fractional distillation of the product, *chaulmoogryl alcohol*, $C_{18}H_{33}.OH$ (m.p. 36°C., $[\alpha]_D + 58{\cdot}4°$) and *chaulmoogryl chaulmoograte*, $C_{17}H_{31}.CO_2.C_{18}H_{33}$ (m.p. 42°C.), together with unchanged chaulmoogric acid.

The saturated acid, *dihydro-chaulmoogric acid*, $C_{17}H_{33}{\cdot}CO_2H$ (m.p. 71–72°C., b.p. 248°C./20 mm.; optically inactive), is formed, however, on reducing bromo-dihydro-chaulmoogric acid with zinc dust and alcohol, or chaulmoogric acid with hydriodic acid and phosphorus. By the latter process, a hydrocarbon, *chaulmoogrene*, $C_{18}H_{34}$ (b.p. 193–194°C./20 mm.) is also formed. *Methyl dihydro-chaulmoograte*, $C_{17}H_{33}.CO_2Me$ (m.p. 26–27°C., b.p. 222–223°C./20 mm.), was prepared from the corresponding acid.

Chaulmoogric acid is not attacked by fused caustic alkalis even at 300°C.

When chaulmoogric acid was oxidized with cold permanganate (1 atom oxygen), *dihydroxy-dihydro-chaulmoogric acid*, $C_{17}H_{31}(OH)_2.CO_2H$ (m.p. 102°C.), was produced, but when the amount of permanganate was equivalent to 4–5 atomic proportions of oxygen, formic acid and *two dibasic acids* were obtained, the latter having the formulæ $C_{15}H_{28}(CO_2H)_2$ and $C_{15}H_{28}O(CO_2H)_2$ (m.p. 128°C.).

The molecular magnetic rotation of ethyl chaulmoograte very closely approximates to the calculated value for an unsaturated ester of the formula $C_{20}H_{36}O_2$, having a closed ring and one ethylenic linkage, the latter being contained in an allyl group. This conclusion, based on the magnetic rotation, is in harmony with the results obtained by the oxidation of the acid.

Chelidonine, Constitution of. J. O. Schlotterbeck and H. C. Watkins. (*Proc. Amer. Pharm. Assoc.*, **51**, 321.) Chelidonine, $C_{20}H_{19}NO_5.H_2O$, is found to contain an OH group, so that its formula may be written $C_{20}H_{18}.OH.NO_4.H_{20}$. No methoxyl groups nor aldehydic nor ketonic groups could be

detected. Attempts to partially oxidize the base have failed, the molecule being either completely oxidized or not at all.

Chloroform, the Function of Alcohol in the Preservation of. — Adrian. (*Journ. Pharm. Chim.* [6], **18,** 5.) The fact that the addition of alcohol has a marked preservative action on $CHCl_3$ has long been known, and is universally taken advantage of for the preservation of chloroform intended for anæsthetic use. The precise rôle of the alcohol has not, however, been fully elucidated. The decomposition by prolonged exposure to light of chloroform free from alcohol is represented by the equations

$$4CHCl_3 + O_6 = 4COCl_2 + 2H_2O + 4Cl$$

and

$$2COCl_2 + 2H_2O = 2CO_2 + 4HCl.$$

Experiments conducted with chloroform treated with various amounts of alcohol show that, strictly speaking, the decomposition is not prevented, but is modified, the ultimate products being trichloraldehyde and other more or less harmless chlorinated acetals instead of the harmful chloroxycarbonic and hydrochloric acids. The first phase of the reaction consists in the formation of acetaldehyde, which combines readily with chlorine. Thus :—

$$C_2H_5HO + Cl_2 = CHO.CH_3 + 2HCl.$$

The free HCl thus formed is then esterified by the excess of alcohol present. If this be sufficient (one per cent.) no free HCl will appear even after exposure to light for two years. If less than sufficient alcohol to combine with the acid and to furnish the requisite acetal have been added, the same products will be found as in the unprotected $CHCl_3$, but in less quantity ; moreover, the decomposition is retarded. Oil of sweet almonds and sulphur are also found to exert a preservative action on $CHCl_3$, doubtless by acting as fixatives of the free Cl at first produced.

Chromous Tartrate, Crystalline. G. Baugé. (*Comptes rend.*, **138,** 1217.) By the action of an air-free solution of tartaric acid on moist chromous acetate in an atmosphere of CO_2, in the cold, a fine blue solution is obtained. On plunging the vessel containing this into a salt-bath a blue crystalline precipi-

tate is formed, while $HC_2H_3O_2$ is liberated. The mother liquor is syphoned off, and the precipitate washed on an aspiration filter, the atmosphere of CO_2 being maintained throughout the whole operation, the washing being performed first with air-free water saturated with CO_2, then with alcohol 90 per cent., absolute alcohol, and ether, in succession. The precipitate is finally dried in a current of CO_2. It consists of a pale blue powder composed of microscopic prisms, having the formula $CrC_4H_4O_6$. It is insoluble in air-free water, hot or cold; in ordinary water it is slowly oxidized, giving a clear violet liquid. It is not acted on by HCl, H_3PO_4 or H_2SO_4 in the cold; on warming they dissolve it, giving blue solutions. In general, it is a very stable salt so long as it be protected from the action of oxygen.

Chrysarobin, Commercial, Constituents of. H. A. D. Jowett and C. E. Potter. (*Journ. Chem. Soc.*, **81**, 1575.) Araroba, or Goa Powder, and commercial chrysarobin, the substance obtained from the former by extraction with solvents as chloroform, have been investigated by Attfield, by Liebermann and Seidler, and by Hesse with varying results. The latter chemist found that crude chrysarobin contained no chrysophanic acid, but was a mixture of two parts of chrysarobin, $C_{15}H_{12}O_3$, and one of its methyl ether. He regarded chrysarobin as the anthranole of chrysophanic acid. Commercial chrysarobin has been examined by the authors and found to contain the following substances, but no chrysophanic acid:—

Chrysarobin, $C_{15}H_{12}O_3$, is the anthranole of chrysophanic acid and identical with chrysophanohydroanthrone obtained by the reduction of chrysophanic acid. It melts at 204°C. When acetylated with acetic anhydride alone, a mixture or diacetylchrysarobin (m.p. 193°) and triacetylchrysarobin (m.p. 238°C.) is obtained, but if sodium acetate and acetic anhydride are used, the triacetyl compound is alone produced.

Methyl ether of dichrysarobin, $C_{31}H_{26}O_7$, melts at 160°C. It yields a soluble pentacetyl compound, m.p. 135°C., identical with Hesse's hexacetyldichrysarobin.

Dichrysarobin, $C_{30}H_{24}O_7$, does not melt below 250°C., but blackens and chars gradually. On acetylation, hexacetyldichrysarobin (m.p. 179–181°C.) is obtained. The formula assigned to this constituent is proved by analysis.

A substance, $C_{17}H_{14}O_4$, m.p. 181°C., which yields an acetyl compound, m.p. 215–216°C.

The two latter substances are contained in crude chrysarobin in only small amount, the greater portion consisting of the two first-named. Methylchrysarobin was not found to be a constituent of crude chrysarobin. Both chrysarobin and dichrysarobin yield chrysophanic acid on oxidation, and methylanthracene by distillation with zinc dust.

Crude chrysophanic acid as obtained from rhubarb contains pure chrysophanic acid, m.p. 190°C. (acetyl-compound, m.p. 206°C.), and the methyl ether of dichrysarobin, and not the methyl ether of chrysophanic acid as previously stated by Hesse.

Chrysophanic Acid and Emodin, the Constitution of. H. A. D. Jowett and C. E. Potter. (*Journ. Chem. Soc.*, **83**, 1327.) The evidence bearing on the positions of the substituting groups in the formulæ for chrysophanic acid and emodin was discussed. It was concluded that chrysophanic acid must be represented as 5 : 8 dihydroxy-1-methylanthraquinone, as previously suggested by Hesse, and emodin as 2 : 5 : 8 : or 3 : 5 : 8-trihydroxy-1-methylanthraquinone.

Emodin, on fusion with caustic alkali or on oxidation with permanganate, yielded no definite product.

By the action of sodium and methyl iodide on emodin, only the monomethyl ether, $C_{16}H_{12}O_4$ (m.p. 200°C.), was formed ; its diacetyl compound melts at 157°C. This emodin methyl ether appeared to differ from the naturally occurring product obtained by Perkin (*Trans.*, **65**, 932). Attempts to synthetize the foregoing di- and trihydroxymethylanthraquinones by the condensation of hydroxysalicylic acid with substituted o- and m-toluic acids, and also of 1-methylphthalic anhydride with quinol, were unsuccessful.

By the condensation of two molecules of hydroxy-p-toluic acid (CH3 : OH=1 : 2), three isomeric dihydroxydimethylanthraquinones were produced.

3 : 5-dihydroxy-2 : 6-dimethylanthraquinone, $C_{16}H_{12}O_4$, which formed yellow leaflets not melting below 300°C., yielded a diacetyl compound (m.p. 215°C.) and a monomethyl ether (m.p. 214–215°C.) ; the latter formed a monoacetyl compound (m.p. 195–196°).

1 : 5-dihydroxy-2 : 6-dimethylanthraquinone formed red needles (m.p. 224–225°C.), did not yield a methyl ether, and was insoluble in dilute ammonia.

3 : 7-dihydroxy-2 : 6-dimethylanthraquinone formed orange-

yellow needles (m.p. 232°C.), and was readily dissolved in dilute ammonia to a red solution.

Cider Vinegar, Analysis and Suggested Standards for. A. E. Leach and H. C. Lythgoe. (*Journ. Amer. Chem. Soc.*, **26,** 375.) The following scheme for the analysis of cider vinegar is recommended:—

Acetic Acid. Three c.c. of vinegar are diluted with about 300 c.c. of water and titrated with N/10 NaOH, using phenolphthalein as indicator. The number of c.c. of alkali used, multiplied by 0·2, gives the percentage of acetic acid, which should not be less than 4·5 per cent.

Solids. Five Gm. of vinegar are weighed into a tared, flat-bottomed platinum dish, subjected for an hour to direct contact with the live steam, of a boiling water-bath, and the residue weighed. It should be approximately 2 per cent.

Ash. The residue from the solids is carefully ignited in a muffle and the resulting ash weighed. It should be about 6 per cent. of the solids.

Alkalinity of the Ash. One hundred Gm. of vinegar are evaporated to dryness in a platinum dish and the residue reduced to an ash in a muffle. The resulting ash is boiled with water, the solution filtered and the residue washed with boiling water till free from alkali. The filtrate is then treated with an excess of N/10 HCl, the solution boiled to expel CO_2, and the excess of acid titrated with N/10 NaOH, using phenolphthalein as indicator. The number of c.c. of N/10 HCl required for neutralization should be equivalent to at least 65 c.c. for each Gm. of ash.

Soluble Phosphoric Acid. The solution of the ash, after titration, is made acid with HCl, and evaporated to dryness, after which 50 c.c. of boiling H_2O are added, and the P_2O_5 determined by titration with uranium acetate in the usual way. At least 50 per cent. of the total phosphates should be soluble in water.

Insoluble Phosphoric Acid. The residue from the ash soluble in water is dissolved in HCl, and the acid solution evaporated to dryness. The residue is then dissolved in about 10 drops of dilute HCl, 50 c.c. of boiling H_2O are added, then about 1 Gm. of $NaC_2H_3O_2$, and the solution titrated with uranium acetate, as in the case of the soluble phosphoric acid.

Reducing Sugars. Two portions of 25 c.c. each are measured into 100 c.c. flasks. One portion is diluted with 20 c.c. of water,

5 c.c. of concentrated hydrochloric acid are added and the solution subjected to inversion by heating to 70°C. for 10 minutes and cooling. Both portions are neutralized with sodium hydroxide and made up to a known volume. The reducing sugars determined by the ordinary methods should be the same before and after inversion. Any increase denotes the presence of cane sugar or glucose.

Polarization. Twenty-five c.c. of the vinegar is precipitated with 2·5 c.c. of 10 per cent. lead acetate solution, and filtered bright. It should show a rotation of between −0·1° to −4·0° in a 200 mm. tube.

Malic acid should be present, as shown both by the lead acetate and the $CaCl_2$ tests. If the vinegar under examination does not give a precipitate with lead acetate settling in a few minutes, it is not cider vinegar. To confirm the presence of malic acid 5 c.c. of the vinegar is treated with 1 c.c. of 10 per cent. $CaCl_2$ solution; filter and add to the filtrate about 3 volumes of alcohol 95 per cent. In the presence of malic acid a flocculent precipitate will occur. Dextrin is also thus precipitated by alcohol, but its presence will be indicated by a dextro-rotation on the polarimetric test. Sulphate also will give a precipitate of $CaSO_4$. If the alcohol precipitate be collected, dried, dissolved in HNO_3, evaporated to dryness on the water-bath, the calcium malate is converted into oxalate, which may be decomposed with Na_2CO_3 by boiling, acidified with $HC_2H_3O_2$, and precipitated with $CaSO_4$. The last reagent is employed to prevent precipitation of any sulphates present as $CaSO_4$.

Cigarette Smoke, Analysis of. J. Pontag. (*Zeits. für Untersuch. der Nahr. und Genussmit.*, through *Analyst*, **28**, 322.) The smoke obtained by means of an aspirator, gave the following constituents in terms of 100 parts of the original tobacco consumed: hydrocyanic acid, 0·080 per cent.; pyridine, 0·146 per cent.; nicotine, 1·165 per cent.; ammonia, 0·360 per cent.; carbon monoxide, 410 c.c. per 100 Gm. of tobacco. The smoke contained 49·7 per cent. of the nicotine originally in the tobacco, but the quantity depends largely on the length of the mouthpiece.

Cinchotannates, Determination of, in de Vrij's Liquid Extract of Cinchona. J. Warin. (*Journ. Pharm. Chim.* [6], **19**, 233.) The method of valuing liquid extract of cinchona by precipitating the cinchotannates with acetic

acid as first suggested by De Vrij, and published in a modified form as the official test in the *Supplement to the Dutch Pharmacopœia*, **1902**, is criticized. The official test is as follows : " Ten Gm. of the fluid extract is treated with 2 Gm. of sodium acetate and 10 Gm. of water. The reddish-brown precipitate of cinchotannates is collected, washed with a little water, dried on the water-bath and weighed." It is found that this washing removes a considerable quantity of alkaloids ; moreover, the alkaloids are not wholly precipitated, a notable amount being left in the mother solution. Increasing the amount of sodium acetate employed was found not to decrease the amount of alkaloid kept in solution. Washing the precipitate with water acidified with acetic acid instead of with plain water was found to increase the loss of alkaloids. It is concluded, therefore, that the method gives unreliable results ; it should be abandoned and the determination of the total alkaloids as such, relied on for the valuation of the fluid extract.

Cineolene. H. Thoms and B. Molle. (*Archiv der Pharm.*, **242**, 181.) By treating cineol with hydriodic acid in the presence of mercury a new hydrocarbon, cineolene, $C_{10}H_{18}$, has been obtained. It boils at 165–167°C., is optically inactive, and has the sp. gr. 0·8240 at 18°C. It forms no additive bromo-derivative. It gives with strong H_2SO_4 *a*–2– cymol-sulphonic acid, which was identified by its barium salt.

Cinnamic Aldehyde, Gravimetric Determination of (as Semioxamazone). Josef Hanůs. (*Zeit. für Untersuch. der Nahr. und Genussmit.*, **18**, 817.) It is found that cinnamic aldehyde, both pure and in cinnamon and cassia oils, may be quantitatively precipitated in the form of semioxamazone $\begin{pmatrix} CO.NH.N=CH-CH=CH:C_6H_5 \\ CO.NH_2 \end{pmatrix}$ by treating the aqueous suspension with a solution of semioxamazide in hot water. About 0·10 Gm. of the aldehyde is weighed off, emulsified by agitation with 100 c.c. of water, treated with 0·25–0·35 Gm. of semioxamazide, dissolved in 15 c.c. of hot water, well shaken together occasionally for 3 hours, then allowed to stand for 24 hours. The crystalline cinnamic aldehyde semioxamazone is then collected on a tared Gooch filter, washed with cold water, dried at 105°C. for about 4 or 5 hours, then weighed. The weight of semioxamazone multiplied by the factor 0·6083 gives the amount of cinnamic aldehyde present. For the determination

of the amount of aldehyde in cinnamon and cassia oil, from 0·15 to 0·2 Gm. is employed; with this quantity the amount of precipitate obtained is convenient to handle and wash.

To determine the amount of cinnamic aldehyde in cinnamon or cassia barks, from 5 to 8 Gm. of the finely ground material are introduced into an Erlenmeyer flask with 100 c.c. of water fitted with a double perforated rubber cork bearing two tubes, the longer of which reaches the bottom of the flask, the shorter leading to a condenser. The longer tube is then attached to a steam generator and a current of steam carried through the apparatus, the volatile oil being thus distilled over in the usual manner. When about 400 c.c. of distillate has been collected the bark will probably be exhausted. The distillate is then transferred to a separator and shaken out three or four times with ether. The ether is separated, the solvent driven off at 60–70°C., and the residual oil, emulsified with 85 c.c. of water, is treated with semioxamazide as described above.

By this method commercial cinnamic aldehyde has been found to yield from 99·21 to 100·66 per cent.; commercial cinnamon oil (cassia oil ?); from 46·78 to 80·51 per cent. of aldehyde; Ceylon cinnamon oil from another source 79·05–80·33 per cent.; synthetic cassia oil, 95·19–95·59 per cent. of cinnamic aldehyde. Cinnamon bark was found to yield from 1·75 to 2·04 per cent. of aldehyde.

The purity of the cinnamic aldehyde semioxamazone was proved by the determination of the nitrogen, which gave figures in accord with the formula $C_{11}H_{11}N_3O_2$.

It is claimed that the method gives results more accurate than those of the bisulphite absorbtion process generally employed. With commercial cinnamic aldehyde the author obtained figures which were nearly 5 per cent. lower than those given by the bisulphite method. With the natural oils, however, the latter method gave results from 4 to 6 per cent. too low. The semioxamazide is thus prepared: Hydrazine sulphate in fine powder, 10 Gm., is treated with a solution of KOH, 9 Gm., in water, 100 c.c. The K_2SO_4 thus formed is precipitated by the addition of 100 c.c. of alcohol. After filtration, the liquid is warmed and oxamethane, 9 Gm., added in small quantities at a time, and the mixture, after being heated for 30 minutes, allowed to cool, when the semioxamazide separates out in pearly scales, which are collected and recrystallized. Oxamethane is prepared by passing gaseous HCl into a mixture of anhydrous oxalic acid,

200 Gm., and absolute alcohol, 300 c.c., keeping the mixture cooled to 0°C. After 12 hours the mixture, cooled by means of ice, is treated with sodium carbonate until it gives an alkaline reaction, care being taken that the temperature does not rise above 0°C. Each 100 Gm. of the oily oxalic ethyl ester thus separated is treated at 0°C. with 42 Gm. of 10 per cent. AmOH solution, and 50 c.c. of absolute alcohol. Oxamethane then separates out and is collected and recrystallized from alcohol.

Cinnamomum pedatinervium, Essential Oil of. E. Goulding. (*Proc. Chem. Soc.*, **19,** 201.) The essential oil of the bark of *Cinnamomum pedatinervium*, a native of Fiji, is a yellowish-brown liquid with a pleasant spicy odour. The $[\alpha]_D = -4° 96'$; $[\eta]_D = 1{,}4963$. It contains 50 per cent. of safrol. 30 per cent. of linalol, 10-20 per cent. of unknown terpenes, 1 per cent. of eugenol, and about 3 per cent. of eugenol methyl ether. The terpene fraction distilled from 167–172°C., sp. gr. 0·8659; $[\alpha]_D - 17{\cdot}72°$. It yielded a liquid dibromide.

Cinnamon Bark Oil, Characters of. (*Schimmel's Report, May*, **1904,** 25.) It is pointed out that the limit of specific gravity 1·025-1·035, prescribed by the B.P., is too high, since that of genuine cinnamon bark oil may fall below the minimum. Oil having the sp. gr. 1·023 has frequently been distilled. This too high limit, therefore, invites sophistication. Attention is also called to the fact that so-called cinnamon bark oils are on the market which contain an abnormally high percentage of cinnamic aldehyde, between 80 and 85 per cent. Since the average percentage in genuine oil is stated to be 70–75 per cent., sometimes ranging from 65 to 77 per cent., it is obvious that these oils are sophisticated with added cinnamic aldehyde. In cinnamon bark oil the aldehyde is a constituent of secondary importance, the delicate and characteristic aroma being due to other constituents. The limit of eugenol in genuine cinnamon bark oil is given at 4–8 per cent.

Cistus monspeliensis and C. salvifolius, Essential Oils of. (*Schimmel's Report, Oct.*, **1903,** 77.) These two species of cistus, from Spain, gave essential oils having an odour resembling ambergris and similar to the essential oil of ladanum resin, which is derived from a member of the same genus.

Cistus monspeliensis gave 0·015 per cent. of oil, sp. gr. 0·9786; $[\alpha]_D = +1° 40'$; acid number, 15·7; ester number, 31·51. It

deposits much paraffin between 20° and 25°C., the m.p. of which is 64°C.

Cistus salvifolius gave 0·024 per cent. of oil, sp. gr. 0·9736; $[\alpha]_D = +17° 20'$; acid number, 16·86; ester number, 22·73. This also throws out paraffin on standing.

Citral, Determination of, and of other Aromatic or Fatty Aldehydes. S. S. Sadtler. (*Amer. Journ. Pharm.*, **76**, 85.) Advantage is taken of the reaction between aldehydes and sodium sulphite, in which 1 molecule of the former liberates 2 molecules of sodium hydrate, as shown in the following equation, in which citral is taken as the example :—

$$C_9H_{15}COH + 2H_2O + 2Na_2SO_3 = C_9H_{17}COH(NaHSO_3)_2 + 2NaOH$$

The oil or other substance is first rendered perfectly neutral by running in N 2 KOH solution, with rosolic acid as indicator, until all free acid is eliminated. Twenty per cent. Na_2SO_3 solution is then made perfectly neutral by heating on the water-bath and running in N/2 HCl solution, again using rosolic acid as indicator.

For oil of lemon, 5 or 10 Gm. are weighed into an Erlenmeyer flask, and after neutralization, 25 or 50 c.c. of the neutral sodium sulphite solution, depending upon the amount taken, is added. When the solutions are mixed a red colour forms at once in the aqueous layer. This is discharged from time to time with N/2 HCl. The flask is then heated and agitated frequently. The reaction is complete in about half an hour, if kept hot, and the layers mixed frequently. When the colour is all discharged, or all but a very faint pink, which is not appreciably affected by a few drops more acid, the number of c.c. of standard acid is noted. An emulsion forms, due to the neutralized resins, but does not interfere with the reaction, if care be exercised.

The amount of standard hydrochloric acid used expressed in terms of citral, in the above ratio of 1 molecule of citral to 2 molecules of HCl, divided by the weight of oil taken, gives the percentage of citral.

Analyses of citral in lemon oil, by this method, gave in two determinations : I., 5·24 per cent. ; II., 5·29 per cent.

Mixtures of known quantities of citral with lemon oil terpene gave equally satisfactory results. The method is applicable

to the determination of vanillin, and to the detection and determination of formaldehyde in milk and other dietetic articles. In the latter case, with perfectly neutral solutions, the presence of 1 : 1,000,000 of formaldehyde in water is readily detectable, and the same applies to the distillates obtained from liquid or solid comestibles. Acetone in wood spirit may be determined by the method, as well as aldehydes in such essential oils as those of cinnamon, cassia, bitter almond and lemongrass.

Citric and Tartaric Acids and their Salts, Detection of Metallic Contamination in. C. T. Bennett. (*Chem. and Drugg.*, 64, 633.) The following modification of the Warington process, which has given good results, is proposed for the estimation of lead in citric and tartaric acids and cream of tartar :—

Ten Gm. is dissolved in 15 c.c. of distilled water, 25 c.c. of solution of ammonia (10 per cent.) added (for cream of tartar 10 c.c. is sufficient) and made up to 50 c.c. One drop of solution of sodium sulphide (10 per cent.) is added, and the coloration produced is matched in Nessler glasses by adding from a burette a standard solution of lead acetate (containing 0·0001 Gm. of lead in 1 c.c.) to 50 c.c. of distilled water containing a drop of sodium sulphide solution. Each tenth part of 1 c.c. will then represent 1 part of lead per million.

If iron be present, the addition of 1 c.c. of a 10 per cent. solution of potassium cyanide is necessary, copper also being eliminated since copper sulphide is soluble in potassium cyanide. A yellow coloration is often caused by the addition of the cyanide, but this gradually disappears on warming. If only slight, it may be matched before adding the sodium sulphide, and the amount of standard lead solution so used deducted from the total quantity required. It is essential that the solution should be distinctly alkaline, or the full colour is not developed.

Sodium sulphide is much preferable to either sulphuretted hydrogen or ammonium sulphide, as no turbidity or coloration is produced in the absence of metals, while its freedom from odour is also a distinct advantage.

With regard to the proportion of lead which may be considered harmless, a maximum of 25 parts per million (or approximately $\frac{1}{6}$ gr. in 1 lb.) would be a reasonable standard. This might be reduced later to 10 parts per million, as greater care is taken by the manufacturers.

The presence of $\frac{1}{55}$ gr. of lead in 10 oz. of lemonade found by the Somerset House authorities, has been held to be non-injurious, and, comparing quantities which would ordinarily be consumed, this represents about 4 grs. in 1 lb. of tartaric or citric acid, assuming a pint of lemonade to be equivalent to three times the maximum dose of tartaric or citric acid.

Tartarated soda invariably contains traces of lead. On account of its comparatively large dose and its wide distribution in the form of seidlitz powders, it is important that the proportion of lead shall be as small as possible. A degree of purity corresponding to a maximum standard of 10 parts per million ought to be easily obtainable.

The presence of arsenic in cream of tartar has lately been the subject of prosecutions, and samples containing $\frac{1}{30}$ gr. in 1 lb. have been condemned. Bird's modification of Gutzeit's method gives excellent quantitative results, which show that few samples are absolutely free, while many of the purest specimens contain $\frac{1}{100}$ to $\frac{1}{50}$ gr. per lb. The latter figure might probably be safely adopted as a maximum until such time as absolute freedom can be obtained by manufacturers.

Citronella Oil, Ceylon, Nature of the Adulterant in Certain Consignments. (*Schimmel's Report, May*, **1904,** 28.) Since in the adulterant separated from sophisticated citronella oil no evidence of the presence of metacymol, which has been stated by Kelbe (Liebig's *Annalen*, **210**, 10) to be a constant constituent of resin spirit, could be obtained, the opinion is expressed that the added substance is not resin spirit, as stated by Parry and Bennett (*Year-Book*, **1903,** 58), but Russian petroleum.

Citronella Oil, Modified, Schimmel's Test for Detection of Impurities in. (*Schimmel's Report, May*, **1904**, 32.) Since certain citronella oils are admitted to bear the addition of 5 10 per cent. of Russian petroleum oil, and yet to pass Schimmel's solubility test in alcohol 80 per cent., it is proposed to modify the test as follows: The test is first performed in the ordinary manner (1 volume of the oil is dissolved in 1-2 volumes of alcohol 80 per cent., and should give a clear solution; it is then further diluted to 10 volumes, when it should remain clear, or, at the most, give only a slight turbidity, and should separate no oily drops on standing in a closed vessel). Five per cent. of Russian petroleum is then added to the oil, and the test

repeated. The turbidity will be slightly greater than in the first test, but no oily drops should separate on standing.

Citronella Oil, Sensitive Test for Detection of Insoluble Adulterants in. K. Bamber. (*Proc. Chem. Soc.*, **19**, 292.) Two c.c. of pure coconut oil, free from acid and accurately measured, is mixed with exactly 2 c.c. of the citronella oil to be examined, and shaken in a graduated tube with 20 c.c. of alcohol 83 per cent. *by weight*, or 87·87 per cent. by volume (sp. gr. 82·73 at 30°C.) at 29–30°C. for 1 minute. The mixture is then centrifugated. On separation, the volume of the oil is read off, and any increase is due to adulterant. By multiplying this increase by 50 the amount of adulterant may be determined.

Schimmels (*Report, May*, **1904**, 30) find the test serviceable, and in some instances more sensitive than Schimmel's test for the qualitative detection of admixture, but consider that it is not suitable for quantitative application, the volume of the separated oil being shown to vary with different specimens of pure citronella oil mixed with the same amount of petroleum.

Cocaine, Crude, Assay of. W. Garsed. (*Pharm. Journ.* [4], **17**, 784.) Four distinct alkaloids, cocaine, truxilline, cinnamyl-cocaine, and tropa-cocaine, are known to exist in coca leaves, though all four may not be present (except, perhaps, in minute quantity) in every sample. Of these, cocaine is the most important. In the process of purification of the crude alkaloid a certain amount of uncrystallizable substance is always obtained; at one time this was called "amorphous cocaine," and from it the other alkaloids mentioned above were subsequently isolated by various workers. Truxilline was originally called cocamine and isatropyl-cocaine by two of its investigators, but the name truxilline is now more generally used.

Cocaine, truxilline, and cinnamyl-cocaine are derivatives of ecgonine. When heated with strong acids or alkalies they undergo hydrolysis, yielding ecgonine and methyl alcohol, and respectively benzoic, truxillic, and cinnamic acids. The production of ecgonine from each of the alkaloids has considerable commercial value, for the process of hydrolysis can be reversed, and from ecgonine, benzoic anhydride and methyl alcohol, cocaine can be prepared, the reaction being almost quantitative. After crystallizing out the cocaine as far as possible from the crude

alkaloid, the amorphous portion is subjected to hydrolysis, and from the ecgonine thus obtained more cocaine is prepared. The whole of the alkaloid contained in the leaves becomes in this way commercially valuable.

Tropa-cocaine is not a derivative of ecgonine, but of pseudotropine. On hydrolysis it yields the latter substance and benzoic acid.

The following equations illustrate these hydrolytic decompositions :—

$$\underset{\text{Cocaine}}{(C_6H_5CO)OC_8H_{13}N(COOCH_3)} + 2H_2O = \underset{\text{Ecgonine}}{HO.C_8H_{13}N(COOH)} + C_6H_5COOH + CH_3OH$$

Benzoic Acid. Methyl Alcohol.

$$\underset{\text{Cinnamyl-cocaine.}}{(C_6H_5.CH{:}CH.CO)OC_8H_{13}N(COOCH_3)} + 2H_2O = HO.C_8H_{12}N(COOH) + \underset{\text{Cinnamic Acid.}}{C_6H_5.CH{:}CH.COOH} + CH_3OH$$

$$2\left\{\underset{\text{Truxilline.}}{(C_6H_5.CH.CHCO)OC_8H_{13}N(COOH_3)}\right\} + 4H_2O = 2HO.C_8H_{13}N(COOH) + 2\underset{\text{Truxillic Acid.}}{(C_6H_5.CH{:}CH.COOH)}$$

$$\underset{\text{Tropa-cocaine.}}{CH_3O(C_6H_5CO)OC_8H_{14}N} + H_2O = \underset{\text{Pseudotropine.}}{HO.C_8H_{14}N} + \underset{\text{Benzoic Acid.}}{C_6H_5.COOH}$$

Liebermann proved the existence of two isomeric forms of truxilline, which he named α-truxilline and β-truxilline respectively. They can scarcely be distinguished from each other, except that on hydrolysis they yield respectively isomeric α- and β-truxillic acids, which have different melting points, and form barium salts of different solubility in water. α-Truxilline constitutes the greater part of natural truxilline. In addition to the four alkaloids already mentioned, the discovery of others has from time to time been announced, but their presence requires confirmation. Tropa-cocaine is much less toxic than cocaine, otherwise its action is similar ; moreover, it is found only in very small quantity, hence it need not receive much consideration in an assay process. The chief alkaloid, cocaine, and the two secondary ones, cinnamyl-cocaine and α-truxilline, are thus left to be dealt with. The determinatio of the last-named is particularly important, for it has been shown by Liebreich and by Stockman to be much more toxic than cocaine.

After a prolonged series of investigations on these bases, which are described in detail, it was found that no direct method of separation was available. The final methods for the separation of the alkaloids were therefore of necessity based on the determination of their decomposition products, obtained by oxidation and hydrolysis.

For assay purposes two distinct processes, based on the experimental work described have been devised.

Process No. 1. The crude alkaloid is weighed, dissolved in dilute sulphuric acid, and subjected to the action of potassium permanganate. The unoxidized alkaloid is re-extracted and weighed : the loss in weight represents the amount of cinnamyl-cocaine present. The re-extracted alkaloid is then subjected to alkaline hydrolysis, and the truxillic and benzoic acids separated by taking advantage of the insolubility of the former in water. From the quantity found of each, the respective amounts of truxilline and cocaine originally present can be calculated. This process admits of the direct determination of the benzoic acid.

Process No. 2. The crude alkaloid is at once subjected to alkaline hydrolysis, the cinnamic acid determined by the bromination method, and the truxillic acid by taking advantage of its insolubility in water. The amount of truxilline and cinnamyl-cocaine present is then calculated. and the difference between their combined weight and the weight of crude alkaloid originally taken represents the amount of cocaine present.

Each process was tried on two samples of crude alkaloid, extracted respectively from Truxillo and Java leaves. The results are given in the following table :—

ALKALOID FROM TRUXILLO COCA.

Crude Alkaloid Taken.	Process No. 1. 0·1540 Gm.		Process No. 2. 0·1232 Gm.	
	Gm.	Per cent.	Gm.	Per cent.
Truxilline found . . .	0·0280	18·2	0·0220	17·8
Cinnamyl-cocaine found .	0·0356	23·1	0·0165	13·4
Cocaine found . . .	0·0800	52·0	0·0847 (by difference)	68·8
Total found	0·1436	93·3	0·1232	100·0

ALKALOID FROM JAVA COCA.

Crude Alkaloid Taken.	Process No. 1. 0·2010 Gm.		Process No. 2. 0·2108 Gm.	
	Gm.	Per cent.	Gm.	Per cent.
Truxilline found . . .	0·0164	8·1	0·0197	9·3
Cinnamyl-cocaine found .	0·1024	= 51·0	0·0801	= 38·0
Cocaine found . . .	0·0740	= 37·0	0·1110 (by difference)	= 52·7
Total found	0·1928	= 96·1	0·2108	= 100·0

The processes appear equally good as far as the determination of truxilline is concerned; process No. 2 has the disadvantage that the cocaine is estimated by difference; in process No. 1 the cinnamyl-cocaine is estimated by difference, and comes out considerably higher than in process No. 2. This is what may be expected, since any impurities oxidizable by permanganate would be calculated as cinnamyl-cocaine. The sum of the percentage results in process No. 1 is over 90, and as it is certain that cocaine and truxilline are practically unaffected during the oxidation of the cinnamyl-cocaine, preference must be given to the permanganate process.

Coconut Fat, Detection of, in Butter. — Lahache. (*Rev. gen. de Chim. appliq.*, through *Annales de Chim. Analyt.*, **9**, 23.) The purified coconut fat, which is now largely produced on the industrial scale, consists of a mixture of pure oleolaurin and oleostearin, the esters of the volatile fatty acids and the free acids having been eliminated. The admixture of this substance with butter may be detected by its behaviour with alcohol 90 per cent. Ten c.c. of the melted fat is shaken up with alcohol 90 per cent. in a 100 c.c. graduated cylinder, and set aside for 6 hours. With pure butter the volume of the lower layer will then be 26 c.c. If it contain an admixture of 16·6 per cent. of pure coconut fat it will be 22 c.c.; with 20 per cent., 20 c.c.; with 25 per cent., 16 c.c.; with 50 per cent., 14 c.c. Pure coconut fat alone gives only 7 c.c. Obviously, the absence of volatile fatty acids will at once distinguish this fat from butter; and in mixtures of it with butter the Reichert-Meisl-Bardy value will be proportionately lowered. Its freedom from increasing rancidity on exposure is another characteristic. The author

states that admixture may also be detected by the microscopic form of the crystals obtained by the evaporation of ethereal solutions of the fats, those from coconut fat being longer, straighter, and differently grouped. Drawings of these accompany the note.

[The microscopic observation of fat crystals is greatly aided by the use of the polariscope, with the intervention of a selenite plate.—Ed. *Year-Book.*]

Cod Liver Oil, Refractometric Examination of. E. Dowzard. (*Chem. and Drugg.*, **63,** 400.) The value of the determination of the refractive index in judging of the purity of cod liver oil is confirmed. The use of Amagat's and Jean's oleorefractometer is advocated for the purpose, although that instrument has an arbitrary scale. The standard oil should be standardized against glycerin, otherwise an error of 2 or 3° is possible. The figure obtained with pure oil is 42–48°; some abnormal oils showed a reading of 49–50°. Any oil having a reading below 42° may be condemned. Among the possible adulterants the following are enumerated: Seal oil, +30 to + 32°; fish oil (salmon), +19°; shark-liver oil, + 29 to + 35°; Japan fish oil, + 50 to + 53°; pilchard oil, + 32 to + 36°.

Colchicine, Determination of, and Distribution of in the Seed. H. Blau. (*Oesterr. Zeits. für Pharm.*, through *Pharm. Centr.*, **45,** 39.) The extraction of colchicine is conducted in the following manner: The material is extracted with three times its weight of alcohol 90 per cent., by heating for 3 hours under a reflux condenser. After cooling and filtering, the alcohol is distilled off, the residue taken up in cold water, allowed to stand, and filtered to remove resin and oil; it is then shaken out with four lots of $CHCl_3$; the $CHCl_3$ is distilled off and the residue again treated in the same manner. The residue obtained on the second distillation of $CHCl_3$ is treated with water and evaporated to dryness to remove the $CHCl_3$ from the colchicine-chloroform compound; when constant in weight it is weighed as colchicine. In this manner the conversion of amorphous colchicine into crystalline colchicine is avoided. This occurs when acid and alcohol are used in the extraction process.

It is found that colchicine resides solely in the brown seed coats; these gave 0·377 per cent. against 0·379 per cent. in the whole seeds. Seeds 20 years old not carefully stored gave only 0·18 per cent. Seeds over 30 years old, kept in a well closed

vessel, contained 0·202 per cent. Seeds over 20 years old, stored in a tin-lined covered drawer, gave 0·2108 per cent. One year old seeds gave 0·504 per cent. It is evident, therefore, that colchicum seeds undergo marked deterioration on prolonged storing, and, for pharmaceutical use, should be fresh. The development of dark colour in tincture and wine of colchicum is attributed by the author to the formation of colchicoresin at the expense of the colchicine. These preparations, therefore, should be freshly prepared and carefully stored.

Colchicine Method of Extraction and Determination. — Bredemann. (*Apoth. Zeit.*, **18,** 817, 828–840.) After comparing most of the published processes for the determination of colchicine, the author advocates the following, which is a modification of that of Katz: The coarsely powdered drug is extracted by percolation with alcohol 60 per cent. Fifty c.c. of the alcoholic percolate thus obtained is reduced by evaporation to 20 c.c.; 0·5 Gm. of paraffin wax is added, then 20 Gm. of water, and evaporation continued until all the alcohol is evaporated. After cooling, the paraffin is separated on a filter, removed, re-melted, and washed again with 10 c.c. of water containing 1 Gm. of acetic acid. This washing, when cold, is passed through the same filter, which is then carefully washed. The bulked filtrate, having been saturated with NaCl, is then shaken out with $CHCl_3$, first with 20 c.c., then with successive 10 c.c.'s, until the aqueous solution gives practically no precipitate with KI solution. The bulked chloroformic extracts are filtered through a filter previously moistened with $CHCl_3$, evaporated, and the residue again taken up with water, to destroy the colchicine chloroform compound formed. The aqueous solution is filtered, evaporated, and the residue, dried over H_2SO_4, is weighed. According to the author, no satisfactory method for the titration of colchicine has yet been found. (See also *Year-Books*, **1897,** 216; **1898,** 207; **1900,** 117; **1902,** 171.)

Colophonia mauritiana, Elemi of. A. Tschirch and O. Saal. (*Pharm. Journ.* [4], **18,** 467.) The sample examined was derived from the Hanbury collection in the Pharmaceutical Society's museum. It originally came from Mauritius. It was treated by Tschirch's method for the separation of acid resins, and found to contain the following constituents: α-isocolelemic acid, 10 per cent.; colelemic acid, 2 per cent.; β-isocolelemic acid, 8 per cent.; colamyrin, 25–30 per cent.;

coleleresen, 30–35 per cent. ; volatile oil, 3 per cent. ; with a small quantity of bryoidin and a bitter substance.

α-isocolelemic acid was removed by shaking out the ethereal solution of the resin with 1 per cent. ammonium carbonate solution. It is amorphous, optically inactive, and melts at 120–122°C. Its formula is $C_{37}H_{56}O_4$.

Colelemic acid, $C_{39}H_{56}O_4$, was then removed by shaking out with 1 per cent. Na_2CO_3 solution. It is crystalline ; m.p. 215°C.

β-isocolelemic acid, $C_{37}H_{56}O_4$, was precipitated with acidified water from the mother liquor of the colelemic acid. It is amorphous ; m.p. 120°C.

Colamyrin, $C_{30}H_{50}O$, like the amyrins of other elemis, with which it is identical, consists of *α*- and *β*-amyrin, the former melting at 181°C., the latter at 192°C.

The *volatile oil* is similar to that obtained from carana elemi ; it had the odour of dill, fennel, and lemon ; the greater part distilled between 170-175°C. The residue, after distillation, gave a small quantity of a crystalline body melting at 135-5°C. This was probably bryoidin.

Colophony, American, Constituents of. A. Tschirch and B. Studer. (*Archiv der Pharm.*, **241,** 495.) American colophony consists mainly of three isomeric resin acids, *α*-, *β*-, and *γ* abietinic acids, $C_{19}H_{28}O_2$. The *α*- and *β*-acids are removed by shaking out the ethereal solution of colophony with 1 per cent. ammonium carbonate solution ; *α*-abietinic acid forms an insoluble lead salt, *β*-abietinic acid does not ; *γ*-abietinic acid is obtained, after removing the other two, by shaking out with 1 per cent. sodium carbonate solution. The colophony examined contained about 30 per cent. of the *α*-acid, 22 per cent. of the *β*-acid, and 31·6 per cent. of the *γ*-acid. Also 5–6 per cent. of indifferent resene, and a trace of volatile oil.

Colophony, American, Constituents of. W. Fahrion. (*Zeits. für Angew. Chem.*, **17,** 239, through *Chem. Centr.* [1], **1904,** 1011.) In connexion with the above results of Tschirch and Studer, the author adheres to his previous statement (*Year-Book*, **1902,** 61) that the chief constituent is a petroleum ether soluble acid, $C_{20}H_{30}O_2$, or possibly several isomers thereof. This is extremely susceptible to auto-oxidation, becoming then insoluble in petroleum ether. The author maintains that this auto-oxidized acid is the *α*-abietinic acid of Tschirch and Studer. This is confirmed by the fact that by treating the

alcoholic solution of the oxidized acid with nascent hydrogen it is reduced and again becomes soluble in petroleum ether.

Conium maculatum, Distribution of Alkaloids in. E. H. Farr and R. Wright. (*Pharm. Journ.* [4], **18,** 185.) In considering the subject of the alkaloidal strength of drugs, it is often assumed that the proportion present in good samples of the drug in question will not show any considerable variation. In other words, it has been far too much the custom to state the alkaloidal content in absolute terms, and to take it for granted that the amount of alkaloidal or other principle present, ought, if it does not, to approximate closely to the quantity found by some worker on the subject, whose results have been based upon the examination of a single sample. Such, of course, is very far from being the case. Not only will the development of active principles be largely affected by conditions of soil, climate, season, and cultivation, but other factors have also to be taken into account.

For instance, the age and sex of the tree or shrub (*Year-Book*, **1902,** 483), or of the organ from which the active principles are obtained, may have a considerable influence upon the yield of such principles.

In the case of conium, the formation of the bases, and their distribution through the plant, have been observed during the whole vegetative period.

The following method was adopted in dealing with the material for examination. The freshly collected drug was dried in warm air, the loss of weight being carefully noted. The average loss in drying was as follows: roots, 77 per cent.; stems and stalks, 86 per cent.; leaves, 79 per cent.; flowers, 80 per cent.; fruit, 68 per cent. A weighed quantity of the dry material was taken, and, if possible, reduced to uniform powder, and exhausted by percolation with 70 per cent. alcohol. If the production of an uniform powder was not feasible, the drug was reduced to coarse powder and macerated for 7 days in ten times its bulk of menstruum, a measured quantity of the tincture being taken for the estimation of the alkaloids.

The proportion of the latter was determined by the following analytical process:—

The tincture was placed in a porcelain dish, 25 c.c. of distilled water containing 1 or 2 c.c. of N/H_2SO_4 added, and the mixture evaporated over a water-bath until all the alcohol had been

dissipated. The remaining liquid was transferred to a separator, the dish rinsed with 5 c.c. of $CHCl_3$, the rinsings added to the contents of the separator, and the mixture shaken. The $CHCl_3$ was drawn off and the process repeated. Any trace of alkaloid removed by the $CHCl_3$ was recovered by agitation with a little acidulated water, the latter being afterwards separated and added to the original liquid. An excess of solution of KOH was then added to the mixed acid liquids, and the alkaloids shaken out with three successive 5 c.c. of $CHCl_3$. The $CHCl_3$ solutions were drawn off in turn and bulked, and the alkaloids extracted by agitation with three successive 10 c.c. of acidulated water. The process of purification above detailed was twice repeated, and the pure alkaloids obtained in $CHCl_3$ solution. The latter was well shaken with three drops of fuming HCl, the mixture transferred to a flat-bottomed glass dish, the last portions being rinsed out with a little absolute alcohol, the $CHCl_3$ allowed to evaporate in a current of warm air, and the resulting hydrochlorides dried at a temperature not exceeding 90°C. until the weight was constant.

Table I.

Percentage of alkaloidal hydrochlorides yielded by different parts of the fresh plant :—

Stage of Development.	Source.	Roots.	Stems and Stalks.	Leaves.	Flowers and Peduncles.	Green Fruit.
Young Plants, 4 – 6 in. high	Uckfield	0·047	0·017	0·030	—	—
Plants, 4ft. high taken before flowering .	Hitchin	0·022	0·019	0·120	—	—
Plants, 3 ft. – 3 ft. 6 in. high, showing incipient inflorescence . .		(*a*) Cortex 0·031				
	Uckfield	(*b*) Axis 0·032	0·037	0·090	—	—
Plants, 5 ft. high in full flower	Uckfield	0·050	0·064	0·187	0·236	0·906
Plants, 5 ft. high in full flower	Ashford (Derbys.)	0·018	0·012	0·075	0·086	(*a*) 0·725 *(*b*) 0·975

* This was obtained from plants growing in the same locality.

TABLE II.

Percentage of alkaloidal hydrochlorides, yielded by samples of hemlock fruit :—

A. Commercial Samples.

1 = 0·096	8 = 0·800
2 = 0·512	9 = 0·800
3 = 0·568	10 = 0·803
4 = 0·600	11 = 0·812
5 = 0·605	12 = 0·816
6 = 0·750	13 = 0·832
7 = 0·768	*Average* 0·574

B. Samples Collected by the Authors.

1 = 1·05	9 = 1·96
2 = 1·14	10 = 2·70
3 = 1·30	11 = 2·72
4 = 1·30	12 = 2·80
5 = 1·53	13 = 2·90
6 = 1·66	14 = 3·30
7 = 1·80	15 = 3·32
8 = 1·88	16 = 3·57
	Average 2·13

The results shown on the first table reveal very clearly the exceedingly rapid production of alkaloids in the plant as growth proceeds. This is more particularly the case during the flowering and fruiting stage. In one specimen, which was kept under observation, the fruit contained about eleven times as much as the flowers, thirteen times as much as the leaves, fifty-four times as much as the roots, and eighty-one times as much as the stems.

Arrived at the fruiting stage, the amount increases rapidly until the fruit is about three parts grown, after which it begins to diminish, at first slowly, then more rapidly. These observations point to the conclusion that the production of the alkaloid is closely associated with the development of the fruit, and its rapid disappearance as the latter approaches the stage of full ripeness, accompanied as it is by an equally rapid increase in the size of the embryo, would appear to indicate that the alkaloids are utilized for the production of proteid reserve material.

In giving the percentages of alkaloidal hydrochlorides yielded by the dry fruit, the results obtained from commercial samples, most of which are presumably of foreign growth, are given separately from those obtained from English-grown fruit. This is done designedly, in order to bring out the vast disparity between the alkaloidal content of the two. The difference is very striking, and may be tersely expressed by the statement that whereas

no sample of imported fruit has yielded as much as 1 per cent. alkaloids, less than that amount has never been obtained from English-grown fruit, when collected at the proper time.

The yield of extractive follows the same rule as that of alkaloids; in other words, it varies with the stage of development of the fruit. From fruit taken at the stage when it is richest in alkaloids (i.e. when three-fourths grown), as much as 20 per cent. of extractive will be yielded to 70 per cent. alcohol, while from fully mature fruit taken from the same plant it will fall as low as 12 or 15 per cent. This has an important bearing upon the question of tincture extractives, and indirectly upon the larger question of standards generally.

The following figures show the range of extractive which may be looked for from an official tincture prepared from the fruit of indigenous plants :—

1	1·85 per cent. w/v.
2	2·50 per cent. w/v.
3	2·75 per cent. w/v.
4	2·75 per cent. w/v.
5	3·25 per cent. w/v.
6	4·15 per cent. w/v.
Average	2·95

Gadd gives 1·5 per cent.; Umney, 1·4; F. W. Fletcher, 3 per cent. The latter figure agrees with the above, and is evidently based upon a tincture made from English fruit, while the others represent what may be expected from a preparation made from imported fruit.

The bearing of all this upon the question of standards is obvious. It happens in some cases that the difference between the normal yield of active principles by home-grown and foreign drugs is so great as to make it a matter of serious consequence which of the two is employed in making pharmaceutical preparations.

The difficulty is increased in the case of some of the drugs from which standardized galenicals have to be prepared, e.g. belladonna root. What rule should be followed by the compilers of the Pharmacopœia in dealing with a problem like this? Should the indigenous drug, as representing the highest degree of physiological activity, be alone official, to the exclusion of the imported article, or should the domain of pharmacy be thrown open for the admission of all fair commercial samples of drugs, whatever the geographical source?

There are two distinct sides to this question, and the reply will probably vary as it is regarded from a medical or economic standpoint. Should the second alternative be adopted by the compilers of a future Pharmacopœia, it will be found necessary to revise the methods adopted in the present one in the treatment of certain drugs, both as regards the framing of formulæ and the fixing of standards. (See also *Year-Books*, **1893,** 366; **1896,** 299; **1897,** 356, 358; **1898,** 210; **1901,** 24; **1903,** 253.)

Cryogenine, Quantitative Reaction for. G. Patein. (*Répertoire* [3], **15,** 530.) The following method is stated to completely precipitate cryogenine from aqueous solutions, so that it is available for the quantitative determination of that body under those conditions. It is not, however, entirely satisfactory for the determination of cryogenine in the urine of patients undergoing treatment with the drug. One Gm. of the substance is dissolved in the smallest possible quantity of alcohol 90 per cent.; the solution is treated with 1 c.c. of formalin and diluted with water. Two or three drops of HCl are then added, and the mixture well shaken. The solution at once becomes cloudy, and in a few minutes the whole of the cryogenine is precipitated in the form of a white, crystalline compound, which may be collected, washed with water, dried, and weighed. The body formed is relatively insoluble in alcohol, ether, and chloroform, insoluble in water. It melts with decomposition at 205°C. Its composition is under investigation.

Cusparia Alkaloids. G. Frerichs. (*Chem. Zeit.*, through *Nouv. Remèdes*, **20,** 59.) Koerner and Boehringer first isolated cusparine, $C_{20}H_{19}NO_3$, and galipine, $C_{20}H_{21}NO_3$, then Beckhurts and Nehring obtained as well cusparidine, $C_{19}H_{17}NO_3$, and galipidine, $C_{19}H_{19}NO_3$. The author has further investigated these bases. The total alkaloids were extracted by ether, and the ethereal extract shaken out with HCl. The alkaloids were precipitated from this acid solution by AmOH, as a resinous mass. Since the crystallizable alkaloids present are powerful bases, they may be removed by shaking out with organic acids, such as tartaric and acetic acids, while the amorphous alkaloids, being relatively feeble bases, do not form salts with these acids, and are therefore left in the immiscible solvent. Heat must be avoided, however, since under its influence the organic salts of the crystalline bases are dissociated, the alkaloids being liberated as oily drops. On decomposing with AmOH the mixed tar-

trates thus obtained, and cooling, a cake consisting chiefly of cusparine and galipidine is obtained. On dissolving this in alcohol and crystallizing, almost pure cusparine is obtained, which is further purified by recrystallization from petroleum ether. The other bases are obtained by the fractional precipitation of the petroleum ether solutions of the precipitate obtained by treating the alcoholic solution of the mixed bases with water. Galipidine alone is not thus precipitated, but is obtained by acidifying the aqueous mother liquor with H_2SO_4 and saturating with an excess of HCl. It then separates out as crystalline galipidine hydrochloride. A method for the complete and ready separation of cusparidine and galipine has not yet been discovered.

Galipidine is a tertiary base. It gives, when treated with methyl iodide, an iodomethylate, which liberates methyl-galipidine on saponification with KOH. The salts of galipidine are always yellow, probably on account of the presence of minute traces of galipine which cannot be removed by repeated fractionation. The base is obtained in colourless crystals by the action of nascent hydrogen, which reduces galipine but not galipidine.

Cusparine is also a tertiary base, and is easily converted into methyl-cusparine. Under the influence of heat it is converted into two new bases, pyrocusparine, melting at 250°C., and another melting at 142°C. When heated with KOH, cusparine and pyrocusparine yield protocatechuic acid, indicating the presence of a benzene nucleus in the molecule. With HNO_3 it forms a nitrate of nitrocusparine with evolution of NO. Free nitrocusparine crystallizes in yellow needles. No phenolic group appears to be present in the cusparine molecule. Galipidine also contains a benzene nucleus.

The amorphous bases were removed from the ethereal solution, after removing the crystalline alkaloids as above, by shaking out with HCl and liberating with AmOH. One alkaloid with a very feeble basic reaction was then separated by dissolving the mixed amorphous alkaloids in petroleum ether and precipitating them with picric acid dissolved in the same solvent; all but this one formed insoluble picrates. It was also obtained by treating the mixed amorphous alkaloids with petroleum ether, in which in the amorphous condition it is readily soluble. By purification it was finally obtained in a crystalline state, in fine crystals, melting at 54°C. It does not form salts: although

soluble in HCl, the free base is left on evaporation, while the HCl is driven off. It may also be shaken out of HCl solution by means of ether. It is very stable, and may be heated to 300°C. without decomposition. Frerichs has named it cuspareine. It gives an iodomethylate with methyl iodide.

Cyanogen, Volumetric Estimation of. J. McDowall. (*Chem. News*, **89**, 229.) A standard solution is made by dissolving 25 Gm. of copper sulphate and pouring the solution into a litre flask, then adding distilled water till the flask is half filled : ammonia is then added till a clear blue liquid is produced ; the liquid is then diluted up to the mark. The solution is standardized by weighing out 0·5 Gm. chemically pure KCN, dissolving in 100 c.c. water, and adding 5 c.c. of ammonia. The blue solution is then run in with constant stirring until the colour begins to disappear slowly, and then drop by drop. The finish is very sharp, one drop being sufficient to tinge the solution a light blue colour, very conspicuous against a white tile.

This method is as accurate as the silver assay, and chlorides do not interfere. It has the advantage over the silver method of not being acted on by light, and is much cheaper, a matter of some importance where many assays of cyanides have to be done daily. It has also a coloured finish, which is preferable to turbidity in volumetric work.

Cyclogallipharic Acid, a New Crystalline Fatty Acid from Galls. H. Kunz-Krause and P. Schelle. (*Archiv der Pharm.*, **242**, 256.) The distillation residue of the ethereal extract of galls, obtained as a bye-product in the preparation of tannin, consists, after the removal of gallic and ellagic acid, of a chlorophyll-coloured mass with a peculiar odour. The new acid is extracted from this by treatment with acetic acid, in which it is soluble. On filtering off from the insoluble chlorophyll and standing, crystals of cyclogallipharic acid separate out. They contain 1 mol. $C_2H_4O_2$ of crystallization, which they lose on prolonged exposure to air. By digestion with alcohol and animal charcoal the acid is obtained pure in the form of small glittering fasiculated prisms. From petroleum ether it separates in satiny unctuous scales. It is insoluble in water, but its salts are soluble. With Fe_2Cl_6 the neutral aqueous of an alkali salt gives a blue precipitate, which is soluble in water, forming a fine blue solution. It melts in a capillary tube at 89°C., and

recongeals at 64–65°C. It is a monobasic oxycarbonic acid, having the constitution $C_{21}H_{34}\begin{matrix}OH\\CO.OH\end{matrix}$. It forms the additive product $C_{21}H_{36}O_3.C_5H_5N$ with pyridine. It unites with two atoms of iodine to form an additive product, but with bromine gives the di-substitution product $C_{21}H_{34}BrO_3$. Oxidized with nitric acid it forms normal butyric and oxalic acids, also two isomeric di-nitro derivatives, $C_{15}H_{23}(NO_2)_2.OH$. It is converted into an anhydroketone at 200°C., cyclogallipharol, $C_{20}H_{35}.OH$, or cyclogallipharone, $C_{19}H_{36}.CO$. The same body is obtained by the dry distillation of the calcium salt, by heating with KOH to 300°C. In alkaline solutions $K_2Mn_2O_8$ forms a new hexadecylic acid, gallipharic acid, $C_{16}H_{32}O_2$, as well as oxalic and normal butyric acids and glycerin. It yields naphthalin and meta-xylol on distillation with zinc dust.

Cypress Oil, Constituents of. (*Schimmel's Report, May*, **1904**, 36.) Cypress oil contains about 65 per cent. of terpenes, chiefly dexto-camphene and dextro-sylvestrene, with some dextro-pinene; 1–2 per cent. of cymene; about 8 per cent. of alcohols, about 8 per cent. of esters, mainly those of terpineol; traces of ketones, and 15 per cent. of cypress camphor. One of the ketones present has a peculiar odour, recalling that of menthone and thujone. Sabinol is probably among the alcohols, and traces of geraniol or some other terpene alcohol. The esters comprise terpinyl acetate and valerianate, as well as the ester of an unidentified acid. No free terpineol is present.

Datura stramonium Seeds, Fixed Oil of. J. W. Baird and F. F. Sleeper. (*Proc. Amer. Pharm. Assoc.*, **51**, 324.) By percolation with gasoline a yield of 32 per cent. of oil was obtained from stramonium seeds. The oil was greenish yellow, with a characteristic odour and slightly acrid taste. It had the following characters: Sp. gr. at 15°C., 0·9199; iodine value, 109·1; Koettstorfer value, 194·0; saponification value, 288·8; acid value, 3·307; Reichert-Meissl value, 0·68; Hehner value, 93 per cent. Many other physical data and colour reactions are given, but the chemical examination of the oil does not appear to have been performed. (See also *Year-Book*, **1903**, 157.)

Diastasic Power of Enzymic Preparations. A. Pollak. (*Zeit. für Untersuch. der Nahr. und Genussmit.*, **6**, 729–733,

through *Analyst*, **28,** 315.) A preliminary experiment is made by heating 50 c.c. of 3 per cent. starch paste, prepared from arrowroot starch, on a water-bath at 37·6°C. with 10 c.c. of a 2 per cent. solution of the extract under examination. The time in minutes is noted when saccharification has proceeded so far that a drop of the solution tested with iodine gives a pure brown coloration. 250 c.c. of the starch paste are then heated to 39°C., and as many c.c. of the extract solution added as the number of minutes which elapsed during the saccharification in the preceding experiment; the whole is then kept at a temperature of 37·6°C. for exactly 30 minutes. The action of the enzyme is now arrested by adding about 3 c.c. of 10 per cent. potassium hydroxide solution, and the volume, after cooling, made up to 300 c.c. with water; the amount of sugar formed in the solution is then determined by Fehling's volumetric method.

Elemi, Carana. A. Tschirch and O. Saal. (*Archiv der Pharm.*, **241,** 149.) The elemi examined was derived from *Protium carana*, March., indigenous to the neighbourhood of San Fernando de Atabapo, on the borders of Venezuela and Colombia. It consists of a greenish yellow mass with an odour of fennel, parsley, and lemon; hard on the exterior, softer internally. It is entirely soluble in ether, by means of which it may be separated from impurities. The purified elemi contains about 20 per cent. of free resin acids, 20–25 per cent. of resinols (amyrins), 10 per cent. of essential oil, and 30–35 per cent. of indifferent resene.

Shaking out the ethereal solutions with 1 per cent. ammonium carbonate removed about 2 per cent. of amorphous isocareleminic acid, $C_{40}H_{56}O_4$, melting at 75°C. One per cent. of caustic soda solution then removed 8 per cent. of a crystalline isomer of this, careleminic acid, $C_{40}H_{56}O_4$, and amorphous carelemic acid, which has the same centesimal composition as *a*-manelemic acid from Manila elemi (*Year-Book*, **1902,** 72). The amyrin is identical with that found in other elemis; melting at 175°C.; optically inactive; separable into the two *a*- and *β*-amyrins, the former melting at 181°C., the latter at 192°C. The essential oil is fragrant; the greater part distils at 170–172°C. Caricleresene, $C_{27}H_4O_3$, is amorphous; it melts at 75–77°C.

Elemi, Caricari, Constituents of. A. Tschirch and L. Reutter. (*Archiv der Pharm.*, **242,** 117.) Caricari elemi

is found to contain the following constituents: Isocarieleminic acid, $C_{38}H_{56}O_4$, removed by shaking out the ethereal solution with ammonium carbonate, 5 per cent; carieleminic acid, $C_{38}H_{56}O_4$, 12 per cent.; carielemisic acid, $C_{37}H_{56}O_4$, 20 per cent., both soluble in caustic soda solution. Amyrin, $C_{30}H_{50}O$, 3 per cent.; carieleresene, $C_{21}H_{46}O_2$, 40 per cent.; essential oil, 3 per cent.; the rest being traces of a bitter principle and impurities. Isocarieleminic acid is amorphous, and melts at 75-76°C.; carieleminic acid is crystalline, occurring in colourless aggregated crystals, which melt at 215°C. Carielemisic acid is separated from the mother liquor after crystallizing out carieleminic acid by precipitating with water acidified by HCl. It is amorphous and melts at 120°C. The essential oil is yellow in colour and has an odour of turpentine, dill, and lemon. The amyrin is identical with that isolated from other elemis. Carieleresene is amorphous and melts at 75-76°C., and gives solutions devoid of optical activity.

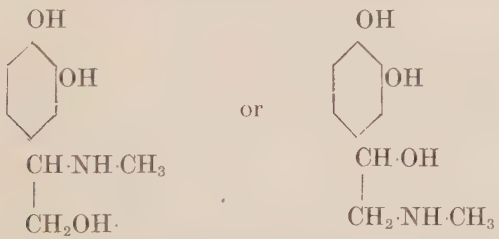
Entada scandens, Saponins from the Seeds of. L. Rosenthaler. (*Archiv der Pharm.*, **241**, 614.) By extracting the fat-free seeds with alcohol 90 per cent., and treating the cold alcohol extract with ether, a crude saponin was precipitated. A strong aqueous solution of this gave, when treated with Ba2(OH) solution, a precipitate of "saponin A." The mother liquor was then freed from excess of Ba2(OH), evaporated to dryness, and the residue extracted with hot alcohol 90 per cent. This alcoholic extract was fractionally precipitated with $CHCl_3$ and Et_2O. By dializing the aqueous solution of the Et_2O ppt. and drying the residual solution over H_2SO_4 *in vacuo*, "saponin B" was obtained as a whitish hygroscopic powder, having the formula $C_{15}H_{22}O_{10}$. On hydrolysis this furnishes a galactose, a sapogenin soluble in ether and in alcohol, and another body, insoluble in those solvents and in ammonia. Entada-"saponin B" gives a dark violet-red colour with strong H_2SO_4, which changes to brown.

Epinephrine, Constitution of. H. A. D. Jowett. (*Proc. Chem. Soc.*, **20**, 18.) "Epinephrin" was the name given by Abel and Crawford to the active principle of the suprarenal glands, and the substance is identical, when pure, with the "adrenalin" of Takamine and the "suprarenin" of von Furth. As Abel and Crawford were the first to isolate the active principle, although in an impure condition, the author has adopted

the name proposed by them. Analysis and molecular weight determinations of carefully purified material confirmed the formula $C_9H_{13}O_3N$, first proposed by Aldrich. In dilute acetic acid solution the compound has $[\alpha]_D - 32{\cdot}6°$.

On oxidation with potassium permanganate, methylamine, oxalic and formic acids were formed. By fusion with potassium hydroxide, a small amount of a crystalline substance was obtained, which gave the protocatechuic acid reaction with ferric chloride. On methylation with methyl iodide and sodium in methyl alcohol, and subsequent oxidation with potassium permanganate, trimethylamine and veratric acid were obtained.

The bearing of these results on the constitution of the base is discussed, the following alternative formulæ being put forward :—



the second of which is considered the more probable.

Erythroxylon monogynum Wood, Essential Oil of. (*Schimmel's Report, May*, **1904,** 97.) The wood of *Erythroxylon monogynum* yields about 2·5 per cent. of a fragrant viscous concrete oil resembling guaiacum-wood oil in odour. It melts at 42–45°C., has the acid number 6·77 ; ester number, 1·56 ; ester number, after acetylizing, 131. Soluble in equal volumes of alcohol 90 per cent., with slight turbidity ; perfectly soluble in more alcohol. On fractionating the oil at 8 mm. pressure, the portion boiling between 212–216°C. gives, when frozen out from petroleum ether, a crop of brilliant needles, which melt at 117–118°C. This body, which is an alcohol, has the formula $C_{20}H_{32}O$. It forms a crystalline acetate melting at 72–73°C.

Essential Oils Extracted from Fresh Flowers by Volatile Solvents. H. von Soden. (*Journ. für Prakt. Chem.* [2], **69,** 256, through *Chem. Centr.* [1], **1904,** 1420.) The following

essential "flower extract oils" were obtained by distilling with steam the flower extracts resulting from the extraction of the fresh flowers with volatile solvents.

Violet Oil from Flower Extract. The yield was 31 Gm. from 1,000 kilo. from the fresh flowers; the oil was greenish yellow, not fluorescent; sp. gr., 0·920; $[\alpha]_D^{17°} + 104° 15'$; acid value, 10; ester value, 27.

Orange Oil from Flower Extract. The yield was 600 Gm. of oil from 1,000 kilo. of flowers; sp. gr. at 15°C., 0·9245; $[\alpha]_D - 2° 30'$; acid number, 4; ester number, 102; equivalent to 35·7 of linalyl acetate; methyl anthranilate, 6·9 per cent.

Reseda Oil from Flower Extract. The yield was 0·003 per cent. of a yellow, not fluorescent, oil, solidifying in the cold and having a powerful odour of mignonette. Sp. gr. at 15°C., 0·961; $[\alpha]_D + 31° 20'$; acid number, 16; ester number, 85. When treated with alcoholic KOH the oil is coloured deep red and gives off a volatile base with an ammoniacal odour. It contains a considerable amount of aldehydes.

French Rose Oil from Flower Extract. The yield is 0·052 per cent. of a reddish yellow oil; congealing point, 5 7°C.; sp. gr. at 15°C., 0·967; $[\alpha]_D^{17} - 1·55°$; acid number, 5·5; ester number, 4·6, equivalent to 1·6 per cent. of geranyl acetate; acetyl value, 295. The oil contains about 20 per cent. of aliphatic terpene alcohols such as geraniol, nerol, and citronellol, and 60 per cent. of phenyl-ethyl alcohol.

German Rose Oil from Flower Extract. This was a golden yellow oil congealing at 12°C. Sp. gr. at 19°C., 0·984; $[\alpha]_D^{17°} + 0° 9'$; acid value, 3; ester value, 4; equivalent to 1·4 per cent. of geranyl acetate; acetyl value, 313·5; phenyl-ethyl alcohol, about 75 per cent., and primary aliphatic alcohols, 15 per cent.

Jasmin Oil from Flower Extract. The yield was 0·077 per cent. of reddish yellow oil of a finer odour than that obtained by solvents from jasmin pomade. Sp. gr. at 15°C., 0·9955; $[\alpha]_D - 1°$; acid value, 2·5; ester value, 190, equivalent to 51 per cent. of benzyl acetate. It had a slight blue fluorescence, and was comparatively rich in indol, which A. Hesse has found in jasmin oil from pomade but not in jasmin oil from the flower extract. The author therefore considers, contrary to A. Hesse, that indol is a normal constituent of jasmin flowers.

Cassie (Acacia) Oil from Flower Extract. The yield was 840 Gm. of oil from 1,000 kilo. of flowers. The oil deposits crystalline needles at 21°C., probably of a paraffin. It congeals

at 18–19°C.; it has no fluorescence. Sp. gr. at 27°C., 1·040; $[a]_D^{25°}$ −0° 40′; acid number, 42·5; equivalent to 10·3 per cent. of salicylic acid; ester value, 114, equivalent to 30·9 per cent. of methyl salicylate.

Ether, Pure, for Anæsthetic Purposes. W. W o b b e. (*Apoth. Zeit.*, **18,** 458.) Pure ether for anæsthetic use should answer the following tests: Sp. gr., 0·718-0·720 at 15°C.; boiling point not under 34°C. nor over 35°C. It should be without effect on Nessler's reagent (20 c.c. of ether shaken with 5 c.c. of the reagent) a test for aldehyde, alcohol and hydrogen peroxide. 20 c.c. shaken in a stoppered cylinder with 5 c.c. of alkaline solution of silver nitrate should cause no change in the solution. 20 c.c. shaken with 5 c.c. of a freshly prepared solution of potassium ferricyanide and ferric chloride and placed in the dark should not colour the aqueous liquid green or blue. 20 c.c. shaken with 5 c.c. of potassium iodide and phenolphthalein solution should not produce a red coloration. The reagent is made by mixing equal volumes of a 50 per cent. solution of potassium iodide and 1 per cent. solution of phenolphthalein; it indicates hydrogen peroxide, which liberates potassium hydroxide from the potassium iodide. 20 c.c. allowed to evaporate spontaneously should leave no residue or odour. The same quantity evaporated with 5 drops of water should leave a residue that neither reddens litmus paper nor bleaches it. The vapour of pure ether should be alkaline to litmus paper.

Ethyl Alcohol, Determination of. S. B u r g a r s k y. (*Chem. Zeit.*, through *Répertoire* [3], **16,** 218.) The following method, based on the reaction $C_2H_5OH + 2Br_2 + H_2O = C_2H_4O + 4HBr$, is stated to give exact results with dilutions containing only 0·5 or even 0·1 per cent. of alcohol. Excess of bromine is added to the liquid to be tested, and the mixture is kept at 80°C. for 2 hours. At the expiration of that time excess of bromine is driven off by boiling, and the HBr titrated in the usual manner by Volhardt's method. The amount found is calculated into alcohol on the above reaction.

Eucalyptus globulus, Essential Oil of; New Sesquiterpene Alcohol in. (*Schimmel's Report, May,* **1904,** 51.) From the last fractions of the distillation of oil of *Eucalyptus globulus* a crop of crystals was obtained, which, when recrystallized from alcohol 70 per cent., formed brilliant, almost odourless needles,

melting at 88·7°C., and boiling at 283°C.; $[a]_D - 35° 29'$. This body proved to be a new sesquiterpene alcohol, $C_{15}H_{25}OH$. When attempts were made to acetylize this alcohol it became dehydrated. With formic acid it also parts with water, and is split up into hydrocarbons, one dextro- the other lævo-rotatory. By repeated fractionation two sesquiterpenes were separated; a lævo-sesquiterpene, $C_{15}H_{24}$, b.p. (6 mm.). 102–103°C; (748 mm.), 247–248°C.; $[a]_D - 55° 48'$; $[\eta]_D^{20°}$ 1·49287, sp. gr. 0·8956; and a dextro-sesquiterpene isomeric with the above; b.p. (750 mm.), 265·5–266°C.; $[a]_D + 58° 40'$; $[\eta]_D^{20°}$ 1·50602; sp. gr., 0·9236.

Eugenol, Determination of, in Clove Oil. (*Schimmel's Report, Oct.*, **1903,** 30.) Since it is found that a 5 per cent. solution of NaOH in the application of Schimmel's modification of Umney's test gives too high results with clove oils very rich in eugenol, the strength of the alkaline reagent is now reduced to 3 per cent. (Compare *Year-Book*, **1903,** 64.)

Eugenol, Determination of, in Clove Oil. H. Thoms. (*Gesellschaft. deutsch. Naturforscher u. Aertze: Kassel, September*, **1903.** *Chem. Zeit.* [78], **27,** 954.) The original method of the author having been shown to be inaccurate, it is now modified to bring it into accord with the more advanced knowledge of the constituents of clove oil. Five Gm. of clove oil is heated on the water-bath with 20 c.c. of 15 per cent. caustic soda solution for half an hour. The liquid, which will then have separated into two layers, is transferred to a separator, the alkaline solution of eugenol is run off, and the remaining layer of sesquiterpenes shaken out twice successively with 5 c.c. of the soda, the separated alkaline liquid being added to that first removed. The bulked alkaline portion is then treated with 6 Gm. of benzoyl chloride, well agitated, when combination, accompanied by the evolution of heat, takes place. The remaining uncombined benzoyl chloride is then eliminated by heating for a short time on the water-bath. After cooling, the crystalline ester is collected on a filter, transferred with 50 c.c. of water to a beaker, and warmed until uniformly melted. The oily liquid is then well agitated with water, and again allowed to crystallize, when the clear water is decanted. This remelting, washing and recrystallizing is repeated twice each time with 50 c.c. of water, when the benzoyl-eugenol will be free from sodium salts and free soda. It is then treated

with 25 c.c. of 90 per cent. alcohol and dissolved on the water-bath. As soon as it has completely dissolved, the beaker is removed from the bath, when the benzoyl eugenol crystallizes out in a few minutes in the form of small crystals. The whole is then cooled to 17°C., and the crystalline precipitate collected on a small tared filter, the filtrate being run into a graduated cylinder. After draining, the crystals are washed with sufficient alcohol 90 per cent. to bring the volume of filtrate to 25 c.c. The moist filter and precipitate are then transferred to a weighing glass, dried at 101°C., and weighed when constant. To the weight obtained an addition of 0·55 Gm. is made for the solubility of benzoyl eugenol in 25 c.c. of alcohol 90 per cent. at 17°C. The percentage of total eugenol in a given weight of clove oil may be found from the formula $\frac{4100\ (a+0{\cdot}55)}{67b}$ where a = the weight of benzoyl eugenol obtained, and b the weight of clove oil taken. The above method gives the total eugenol-content of the clove oil. If it be desired to ascertain the amount of free eugenol, 5 Gm. of the oil is dissolved in ether and shaken out rapidly in a separator with 20 Gm. of 15 per cent. soda solution. After withdrawing the alkaline liquid, the ethereal solution is again washed with 5 c.c. more soda solution. The bulked alkaline solutions are warmed to drive off the dissolved ether, then treated with benzoyl chloride as described above. Having thus determined the total and free eugenol, the amount of eugenol combined as esters is found by difference. (See *Year-Book*, **1903, 64**; **1902, 59**.)

Eupatorium capillifolium, Essential Oil of. (*Schimmel's Report, May*, **1904**, 96.) The flowering herb of the Florida dog fennel yielded about 0·1 per cent. of pale yellow oil containing much phellandrene. It had the following characters: Sp. gr. at 15°C., 0·876; $[\alpha]_D$ −1°; ester number, 7·94. Soluble 1 : 1 in alcohol 90 per cent., becoming cloudy on further addition of the solvent.

Euphorbone. W. M. Ottow. (*Archiv der Pharm.*, **241**, 223.) Reviewing the results of previous investigations on the crystalline principle of euphorbium resin, differing formulæ and characters appear to have been attributed to the substance, due, according to the author, to the readiness with which it undergoes decomposition. The method of Henke was employed to extract euphorbone. This consists of extracting the resin

by percolation with light petroleum ether (b.p. 60–70°C.) The percolate was concentrated to one half by distillation, and the euphorbone crystallized out from the residual liquid. It was then purified by recrystallization either from petroleum ether or from methylic alcohol. It was found that the menstruum from which it was thus crystallized profoundly modified the characters of the body. Euphorbone crystallized from petroleum ether formed slender needles or foliaceous rosettes, which obstinately retained a portion of the solvent, from which they could not be absolutely freed. This form, after drying, softened at 67–68°C., and melted at 71°C., but the melted liquid did not become clear until 75°C. was reached.

Euphorbone crystallized from methylic alcohol formed hard, brittle crusts. It softened at about 110°C., melted at 114–115°C., and became clear at 116°C. This form does not retain any of the solvent in the crystals, and is readily obtained pure.

Pure euphorbone has the formula $C_{27}H_{44}O$. Under the influence of heat it rapidly becomes resinified at about 70°C. It is tasteless, and almost insoluble in water. Its aqueous and alcoholic solutions give no precipitate with tannin. Its rotation in chloroformic solution is dextrogyre. In H_2SO_4 it dissolves, giving a yellow solution which slowly changes to blood-red in the cold, or immediately on warming. After long standing it becomes brown, with a slight fluorescence, this becoming more evident on dilution with water. A mixture of H_2SO_4 and HNO_3 gives, with euphorbone, an orange-red colour, with no trace of violet. Its alcoholic solution is not coloured by Fe_2Cl_6. Chloroformic solutions are coloured reddish-yellow by H_2SO_4, becoming brown after 24 hours, while the supernatant liquid remains colourless. If a few drops of H_2SO_4 be added to a solution of euphorbone in acetic anhydride, the mixture being kept cold, a yellow colour is first produced, which becomes red, and after some hours develops a fine green fluorescence and gives an emerald green solution on dilution with water. These reactions are analogous to, but differ from, those of phytosterin.

Euphorbone combines with bromine, forming a crystalline compound, $C_{27}H_{44}Br_2O$, which melts at 81°C.

Euterpe oleracea, Fixed Oil of the Seeds of:—"Pinot" Oil.—Bassière. (*Journ. Pharm. Chim.* [6], **18**, 323.) The kernels of the seeds of *Euterpe oleracea* yield, on boiling with water and skimming, a fatty oil, which is known as "*Pinot*

oil," "*Para palm oil*," and "*Para butter*." The palm yielding the fruit is very plentiful in the dried-up salt marshes and lagoons of French Guiana. When fresh, the oil is said to be clear and to have a pleasant flavour and odour, but the specimen sent to Europe for examination had, six months after preparation, a most unpleasant taste. It had the following characters: Acid number, 81·7; saponification number, 162·4; iodine number, 136; m.p. of fatty acids, isolated by saponification, 12°C. These fatty acids consist of 52 per cent of oleic acid, and 48 per cent. of acids solid at normal temperatures. The oil is only slightly siccative. It is readily saponified, giving a soap which lathers well.

Extracts and Tinctures, Alkaloidal Assay of. E. Beuttner. (*Schweiz. Woch. für Chem. und Pharm.*, **52**, 57, 74, 89, 101.) The author has adopted, with slight modifications, the method of Panchaud. The chief modifications consist in avoiding excessive dilution with water before shaking out; the employment of sand only in those cases where an excessive amount of extractive has to be dealt with; the employment of a minimum quantity of ammonia to liberate the bases; and the filtration of the ether solution through fat free absorbent cotton instead of filter paper. The following is the general scheme for analysis:—

Soft extracts. Three or 4 Gm. is dissolved in a small flask with 5 c.c. of water and 3 Gm. of alcohol 90 per cent. The solution is evaporated to about 8 Gm. One or 2 c.c. of Et_2O is added, and the liberated alkaloids shaken out with ether.

Fluid extracts. Four or 5 Gm. is mixed in a small flask with 4–6 Gm. of water; evaporated to 4 or 6 Gm., and treated as above.

Dry extracts. One or 2 Gm. is dissolved in a flask with 5 Gm. of water and 3 Gm. of alcohol, evaporated to 5 or 6 Gm. before liberating the bases, and shaking out.

Tinctures. Fifty to 60 Gm. is evaporated in a flask to 8 or 10 Gm., then treated as above.

Cinchona. Certain drugs require special treatment as follows: *Fluid extract.* Three Gm. is mixed in a 200 c.c. flask with alcohol, 6 Gm., and washed sand, 5 Gm., and water, 6 Gm., and evaporated on the water-bath to 12 Gm. The residue is then treated with a mixture of Et_2O, 90 Gm., $CHCl_3$, 30 Gm., and dilute AmOH, 1 Gm., and shaken for 15 minutes. After standing for another 15 minutes 100 Gm. of the ethereal solution is

filtered through a pledget of absorbent cotton into a 300 c.c. flask and distilled. The residue is taken up with 10 c.c. of absolute alcohol, treated with 10 c.c. of H_2O, 30 c.c. of Et_2O, 3 drops of 1 per cent. solution of hæmatoxylin and titrated with N/10 HCl in the usual manner. The result found indicates the amount of alkaloids in 2·5 Gm. of the original extract.

Dry extract. 1·2 Gm. is dissolved in a 200 c.c. flask with a mixture of alcohol, 4 Gm., and H_2O, 8 Gm.; 5 Gm. of sand is added, and the mixture evaporated to 12 Gm. The process is then conducted as above. The result gives the amount of alkaloids in 1 Gm. of extract.

Tincture. Twenty-five Gm. with 5 Gm. of sand is evaporated to 5 Gm., then treated as above with the ether-chloroform solvent. The result is the amount of alkaloids in 20 Gm. of the original tincture.

Aconite Root. *Tincture.* 60 Gm. is evaporated to 10 Gm. and transferred to a bottle. The evaporating dish is washed out with several lots of ether, one drop of AmOH being added with the first washing. The ether is added to the aqueous solution in the bottle and the total weight of the ether made up to 60 Gm. 1 Gm. of dilute AmOH is then added, and the mixture is well shaken frequently for 15 minutes. After standing for another 15 minutes 50 Gm. of the ethereal solution is decanted off through absorbent cotton wool into a 200 c.c. flask. The solvent is distilled off until the residue weighs about 10 Gm. This is treated with 5 c.c. of absolute alcohol, 30 c.c. of ether, and titrated with N/10 HCl, using hæmatoxylin as indicator. The result gives the amount of alkaloids in 50 Gm. of tincture. One c.c. of N/10 HCl = 0·0645 Gm. of aconitine.

Nux Vomica. *Extract.* 1·20 Gm. of extract is dissolved in 4 Gm. of alcohol, 8 Gm. of water, and evaporated on the water-bath to 7 Gm. The residue is treated with $CHCl_3$, 40 Gm., and Et_2O, 80 Gm.; AmOH, 1 Gm., is then added. After extraction, 100 Gm. of the ether chloroform is decanted through cotton wool, and titrated as above with N 10 HCl. The result gives the total alkaloids in 1 Gm. of extract.

Tincture. Forty Gm. is evaporated in a flask to 10 Gm., then extracted as above with $CHCl_3$, 20 Gm., Et_2O, 60 Gm. 60 Gm. of the ether chloroform solution contains the alkaloids of 30 Gm. of tincture. It is titrated as described above.

Ipecacuanha. *Fluid extract.* Five Gm. and 4 Gm. of water are evaporated to 5 Gm. This is treated with 1 Gm. of dilute

AmOH and 100 Gm. of Et_2O. After shaking out, 80 Gm. of Et_2O is decanted and titrated as described above. The result gives the alkaloids in 4 Gm. of the fluid extract.

Tincture (or Wine). Forty Gm. is evaporated to 8 Gm., treated with 1 Gm. of AmOH and 80 Gm. of Et_2O. After extraction, 60 Gm., equivalent to 30 Gm. of original tincture, are decanted and titrated.

Belladonna. *Leaves.* Fifteen Gm. of powdered leaves is macerated with 95 Gm. of dilute alcohol for 24 hours with frequent agitation. 50 Gm. of the liquid is then filtered off and evaporated on the water-bath to 12 Gm. When cold the weight is made up to 15·2 Gm. with water. From this 12 Gm. is filtered off through a small filter into a bottle; 60 Gm. of Et_2O and 1 Gm. of AmOH are added. After shaking out and allowing to separate, 50 Gm. of the ether extract is decanted through absorbent cotton and distilled to dryness. The residue is treated with three successive 5 c.c. of Et_2O, which is again entirely evaporated. The residue is then dissolved in 5 c.c. of absolute alcohol, 10 c.c. of H_2O, and 30 c.c. of Et_2O are added and titration performed with N/10 HCl with hæmatoxylin indicator. The result obtained indicates the amount of alkaloid in 5 Gm. of leaves. One c.c. of N/10 HCl = 0·0289 Gm. of alkaloids.

Extract. Three Gm. of extract is dissolved in 5 Gm. of H_2O in a 200 c.c. flask on the water-bath. The solution is treated with 90 Gm. of Et_2O and 1 Gm. of AmOH. After agitation and separation 60 Gm. of the ethereal solution, equivalent to 2 Gm. of extract, is decanted and titrated as above.

Tincture. Sixty Gm. of tincture is evaporated to 12 Gm. After cooling, enough water is added to make the weight 15·5 Gm. The mixture is filtered through a small filter to obtain 12·5 Gm. of filtrate, which is then shaken out with 60 Gm. of Et_2O and 1 Gm. AmOH. Forty Gm., equivalent to 40 Gm. of tincture, is decanted, and then titrated as above.

Hyoscyamus. *Leaves, Extract and Tincture* are treated precisely as described for belladonna.

Coca. *Leaves.* The author merely modifies the method of Panchaud by using one-fourth the quantity of ammonia to liberate the alkaloids.

Fluid extract. Ten Gm. of the fluid extract and 5 Gm. of water are evaporated to 10 Gm.; shaken out with Et_2O, 100 Gm., and AmOH, 1 Gm.; 80 Gm. of the ether is decanted into a separator, and shaken out with successively 30, 20 and 10 c.c.

of HCl 1 : 200. The bulk acid solutions are filtered, the filter washed, and the alkaloids liberated with ammonia and shaken out in a separator with three successive 30 c.c. of ether. The bulked ethereal solution is distilled, the residue dried at 100°C. and weighed.

Fatty Acids, A New Means of Identifying. R. Locquin. (*Comptes rend.*, **138,** 1274.) The fatty acids are first converted into acetol esters, then treated with semicarbazide, with which they form crystalline semicarbazones of distinctive melting points.

The acetol esters are formed by treating a molecular weight of the acid, dissolved in anhydrous ether, with the theoretical amount of metallic sodium, and adding, after action has ceased, a molecular weight of pure monochloracetone ; the mixture is then heated on an oil-bath for about 4 hours at 120–130°C., when the reaction takes place according to the following equation :—

$$CH_3.CO.CH_2Cl + R.COONa = CH_3.CO.CH_2.COO.R + NaCl.$$

After cooling, the product is treated with water and ether, the ethereal solution washed with Na_2CO_3 and H_2O ; the solvent driven off and the acetol-ester rectified *in vacuo*. The purified ester thus obtained is converted into its semicarbazone by treatment with semicarbazide in acetic acid solution. Thus obtained, the semicarbazone of acetol-acetic ester crystallized from methyl alcohol melts at 147–148°C. ; (149–150°C. corr.) while the m.p. of the butyric ester is 81–82°C. (82–83°C. corr.) ; of the caproic ester, 90°C. (91°C. corr.) ; of the decyclic ester, soluble in boiling petroleum ether, 103–104°C. (104–105°C. corr.), and of the myristol ester, 110–110·5°C. (111–112°C. corr.)

Fish-liver Oil. J. C. Umney and C. T. Bennett. (*Chem. and Drugg.*, **63,** 37.) A sample of non-freezing fish-liver oil has been met with, the odour of which was by no means disagreeable, yet it did not possess the precise flavour characteristic of Norwegian cod-liver oil. This sample was found to answer the tests of the British Pharmacopœia, 1898, with the exception of the albumin-reaction, which is usually afforded in about 6 hours by the best grades of non-congealing Norwegian cod-liver oil. When immersed in a freezing-mixture for 2 hours no cloudiness was observed during that period. The oil gave a well-marked violet colour with strong sulphuric acid, and the sp. gr. came within the prescribed limits.

As it was recognized that such a product might under certain conditions escape detection when mixed with genuine cod-liver oil, further experiments were made to determine what chemical tests are necessary to detect it, and how, by the addition of further tests to those now in the British Pharmacopœia, it may be excluded. The physical and chemical characters are shown in the table appended in comparison with samples of Norwegian and Newfoundland oils :—

—	Fish Oil.	Norwegian Cod-liver Oil.	Newfoundland Cod-liver Oil.
Sp. gr. at 15°C. . .	0·922	0·928	0·927
Refractive index at 15°C.	1·4765	1·4828	1·4832
Saponification value .	187·0	192·9	197·6
Iodine absorbed in 4 hrs. (P. G. test) . .	148·5	137·1	136·4
Free fatty acids (calculated as oleic acid) .	3·10%	0·70%	1·55%
Fatty acids — melting point	26·5°C.	23·5°C.	26·5°C.
H_2SO_4	Intense purple	Well marked purple	Well marked purple
HNO_3 (Fuming) . .	Pale rose with slight purple colour at first	Pale rose with faint purple colour at first	Pale rose colour
One drop H_2SO_4 added to 1 drop of the oil in 20 drops CS_2 . . .	Intense purple fading in 15 minutes	Well marked purple, fading more slowly	Well marked purple, fading more slowly
HNO_3 (B.P. test) . .	Very faint albumen ring in 6 hours	Well marked albumen ring formed in about 6 hours	Well marked albumen ring formed in 6 hours

Fluorides, Detection of in Butter. A. Leys. (*Journ. Pharm. Chim.* [6], **19,** 243.) The following method, employed in the Paris Municipal Laboratory, affords a simple and satisfactory means of detecting the presence of fluorides in butter. It consists in removing the albuminoids from the aqueous extract by means of picric acid solution, and, after filtration, precipitating the fluorides with a reagent of calcium phospho-citrate. This latter is employed in preference to the ordinary $CaCl_2$ reagent, since that reagent may give a precipitate with the decomposition products of the albuminoids present, or with a trace of sulphate. 150 200 Gm. of the butter is melted in a porcelain capsule on the water-bath, and allowed to remain for 3 or 4 hours in the

liquid state. The suspended water will by this time have settled out. The greater part of the clarified supernatant fat is decanted and 30–35 c.c. of boiling 2 per cent. solution of picric acid is poured directly on to the residue in the capsule, while the latter is still hot. The mixture is set aside in the cold until the next day, when the cake of solid fat is pierced and a portion of the aqueous liquid run on to a small filter. Meanwhile the calcium phospho-citric reagent is thus prepared: Ten Gm. of citric acid is dissolved in boiling water and saturated while boiling with precipitated calcium phosphate until a portion of the phosphate remains undissolved. The solution is then filtered and made up to 100 c.c. It may be preserved by the addition of a few drops of formalin. A few drops of this reagent, added to the picric acid filtrate from the butter and warmed, gives a more or less copious precipitate or turbidity in the presence of fluorides, fluoroborates or fluorosilicates.

The presence of any phenolic preservative may be demonstrated in the same solution by the addition of neutral Fe_2Cl_6, with which picric acid gives no reaction. The production of a brown colour indicates the presence of bodies of this class.

Boric acid may be detected in the unused portion of the picric acid aqueous separation. This is evaporated to dryness in a porcelain capsule on a sand-bath, when the greater part of the acid is volatilized. The residue is gently ashed, the ash moistened with H_2SO_4, a little methylic alcohol added and ignited, when the characteristic green flame of boric acid will be obtained.

Formaldehyde, Determination of, in Solution. G. Lemme. (*Chem. Zeit.*, **27,** 896, through *Analyst*, **27,** 363.) The method is based upon the formation of sodium hydroxide when formaldehyde reacts with sodium sulphite, according to the equation:—

$$HCOH + Na_2SO_3 + H_2O = H_2COH.NaSO_3 + NaOH.$$

In order to estimate formaldehyde in this way, a solution containing 250 Gm. of crystalline normal sodium sulphite in 750 c.c. of water is prepared. One hundred c.c. of the reagent are taken, and, since the salt is alkaline to phenolphthalein, bisulphite solution is dropped in till the liquid is neutral to that indicator. Five c.c. of the formaldehyde solution are next added, and the amount of sodium hydroxide set free is titrated with normal sulphuric acid. The colour change is not quite sharp, and

readings may vary some 0·1 or 0·2 c.c.; but in view of the fact that if the formalin is of 40 per cent. strength, about 70 c.c. of alkali will be required, this does not appreciably affect the accuracy of the process. (Compare *ante*, p. 18.)

Formaldehyde, Presence of, in the Atmosphere. H. Henriet. (*Comptes rend.*, **138,** 203.) The author has previously (*Year-Book*, **1903,** 130) recorded the presence of a reducing organic gas in the atmosphere. This is now shown to be formaldehyde, giving the characteristic reaction both with Lebbin's alkaline resorcine test, and also Farnsteiner's colour reaction, and forming HCN from NH_3O. The amount present is considerable, oscillating between 1 : 100,000 and 5 : 1000,000 by weight of air.

Formaldehyde a Normal Constituent of Combustion Products. A. Trillat. (*Comptes rend.*, **138,** 1611.) Formaldehyde is found to be invariably present in the smoke and products of combustion of organic matter. Such substances as wood, paper, pure cellulose, rubber and tobacco, give, when burned, from 1 : 1,000 to 1 : 10,000 of their weight of formaldehyde. It is also formed, but in less quantity, when simple hydrocarbons are burnt. For instance, benzol gave 1 : 120,000; toluene, 1 : 80,000, and xylene, 1 : 40,000. Although the quantity may vary with the conditions under which the combustion takes place, formaldehyde is invariably formed. It will probably be found that the smoky air of manufacturing towns is markedly richer in formaldehyde than the atmosphere of those places not contaminated by smoke.

[The presence of the notable quantity of formaldehyde in wood smoke doubtless partly accounts for its preserving and hardening action on flesh, and increases the antiseptic properties of the volatile phenolic bodies present, as shown by the ancient and effective method of "curing" employed with so many dietetic articles.—Ed. *Year-Book.*]

Formaldehyde and Acetaldehyde, Action of H_2S on. J. Drugman and W. E. Stockings. (*Proc. Chem. Soc.*, **20,** 115.) Provided strong mineral acids are absent, the action of H_2S affords a sure method of detecting formaldehyde even in the presence of acetaldehyde or other higher fatty aldehydes.

When a dilute aqueous solution of formaldehyde is saturated with H_2S, in the absence of HCl, and set aside at 30–50°C., no visible change occurs for 3–4 hours; but afterwards a white,

amorphous, flocculent precipitate is gradually formed. This characteristic thio-derivative is formed from formaldehyde in the presence of acetaldehyde, methyl and ethyl alcohols, acetone, or acetic acid. The m.p. of the product formed in the presence of acetone or acetic acid is fairly definite, 98–103°C. According to Baumann it has the composition $3(CH_2S)CH_2O$. The presence of even 0·1 per cent. of formaldehyde may be detected by this reaction. Acetaldehyde, propaldehyde and isobutaldehyde, treated with H_2S under similar conditions, give a turbid solution and separate oily drops on standing, but no solid particles are formed. If HCl be present in the solution of formaldehyde, which is treated with H_2S, crystalline, trithioform-aldehyde, $(CH_2S)_3$, is formed, m.p. 216°C., when purified by recrystallizing, from acetone.

Several other distinct thio-derivatives may be obtained by the action of H_2S on aqueous or alcoholic solutions of formaldehyde in the presence of HCl.

Formaldehyde and Trioxymethylene, Method of Titration. C. Kleber. (*Pharm. Review*, **22,** 94.) To a strong solution of sodium bisulphite sufficient NaOH is added to remove the odour of SO_2. It is then diluted so that 30 c.c. exactly neutralizes 50 c.c. of N/NaOH solution with phenolphthalein as the indicator. Five c.c. of the formaldehyde solution to be tested is first rendered neutral by the addition of a few drops of NaOH in the presence of phenolphthalein, then the standard bisulphite solution is gradually run in from a burette, until the red colour which is at first produced finally disappears. With commercial formalin, containing about 40 per cent. of formaldehyde, the heat of combination is sufficient, with slight warming at the end of the process to complete the reaction. With more dilute solutions, after decolorization, the mixture should be warmed; if the red colour reappear, more bisulphite should be run in. 1 c.c. of bisulphite solution prepared as above = 0·05 Gm. of formaldehyde. The solid preparations of paraform-aldehyde may be treated in a similar manner, a known weight of the powdered material being gently warmed with a few c.c. of water, then titrated as above.

Iron and Aluminium, Formic Acid for Separating. A. Leclère. (*Comptes rend.*, **138,** 146.) The solution, acidified with sulphuric acid, is treated with ammonium formate and an excess of ammonium thiosulphate to keep the iron in solution

in the ferrous state. On boiling the mixture, aluminium is progressively and entirely precipitated as basic formate, mixed with a little sulphur. The precipitate is collected, moistened with nitric acid, calcined and weighed in the form of alumina. The iron in the filtrate may then be precipitated in the warm solution by means of ammonium sulphydrate.

Geranium, Essential Oil of; New Constituents of. (*Schimmel's Report, May*, **1904,** 56.) Amyl alcohol, pinene, phellandrene and linalol have been added to the number of known constituents of this oil. Those previously recorded are: geraniol, citronellol, menthone, tiglinic acid, fatty acids and a paraffin melting at 63°C.

Geum urbanum, Essential Oil of. E. Bourquelot and H. Hérissey. (*Journ. Pharm. Chim.* [6], **18,** 369.) The authors find that the essential oil of the root and fresh herb of *Geum urbanum* contains eugenol, to which the clove-like odour is due. This body does not, however, exist in the plant, as such, but is produced by the action of a specific ferment on a glucoside in the plant. The fresh plant, when bruised and allowed to macerate in water for 12 hours, gives a small quantity of this eugenol-containing oil. The alcoholic extract, however, obtained with boiling alcohol 95 per cent., gives an aqueous solution which is odourless; the same solution fermented with ordinary yeast, loses sugar, but develops no clove-like odour. On adding a solution of the specific ferment of the plant, the odour of eugenol becomes evident, and the optical rotation of the liquid, originally lævogyre, becomes dextro-rotatory.

Gingergrass, Essential Oil of, New Alcohol in. (*Schimmel's Report, May*, **1904,** 56.) The geographical and botanical sources of this oil, which, as met with in commerce, is of doubtful purity, are not known with certainty. A specimen of apparently genuine oil had the following characters: Sp. gr. at 15°C., 0·9380; $[\alpha]_D$ +22° 40′; saponification number, 24; saponification number after acetylizing, 166; solubility in alcohol 70 per cent., 1 : 2·7, with slight turbidity on adding more alcohol. In the lower fractions 40–80°C. (under 4 mm. pressure) phellandrene was detected; the greater part of the oil, after saponification, distilled at about 106°C. (under 10 mm. pressure), and consisted of a mixture of geraniol and another unidentified alcohol, which could not be completely purified from geraniol. It forms an

acetic ester, having the odour of spearmint; this boils at 90–91°C. (under 4 mm. pressure); has the sp. gr. 0·9725; $[\alpha]_D - 4° 30'$. The alcohol liberated by saponification had the sp. gr. 0·9503; $[\alpha]_D + 8° 40'$, and the b.p. 92–93°C. (under 5 mm. pressure). When isolated from the mixed benzoates by saponifying and removing the geraniol as the $CaCl_2$ compound, the new alcohol was found to have a higher rotation, $+13° 46'$, than that obtained from the acetate. In other characters it was practically identical.

Globularia alypum, Constituents of. R. Tiemann. (*Archiv der Pharm.* **241,** 289.) The author has been unable to confirm the presence of the glucoside globularin, $C_{15}H_{20}O_8$, isolated by F. Schlagdenhauffen from *Globularia alypum*. By extraction with ether and treating the ethereal extract with magnesia, then with water, and decomposing the aqueous solution with H_2SO_4, Tiemann has obtained a precipitate from which he has isolated crystalline *globularic* acid, $C_{26}H_{32}O_7$, and amorphous *picroglobularin*, $C_{24}H_{30}O_7$. Globularic acid melts at 228–230°C., is very soluble in alcohol, acetone, acetic acid and acetic ether; less soluble in ether and chloroform; insoluble in water. It forms colourless solutions with alkalies, and is not coloured by Fe_2Cl_6. Its solutions are devoid of optical activity.

Picroglobularin occurs as a white powder readily soluble in alcohol, chloroform, acetone and other solvents; sparingly soluble in ether and benzol, almost insoluble in water. It has an intensely bitter taste. It softens at about 60°C., and melts at 100°C. with decomposition. Fe_2Cl_6 gives a reddish-brown colour with an alcoholic solution of picroglobularin. It cannot be hydrolized and is not a glucoside.

From the alcohol extract, after removing the ether-soluble constituents, a green resin and a yellow crystalline colouring matter, *globulariacitrin*, $C_{27}H_{30}O_{16}$, were isolated. Globulariacitrin is sparingly soluble in cold water, but readily dissolves on warming. It is insoluble in ether, benzol and chloroform, but is dissolved by other organic solvents. It gives deep yellow solutions with alkalies and golden yellow with H_2SO_4; HNO_3 gives a blood-red colour, $CuSO_4$ and Fe_2Cl_6 bright green. Basic lead acetate removes it from alcoholic solution as an orange precipitate which is soluble in acetic acid.

When hydrolized with dilute H_2SO_4 globulariacitrin is split up into a quercetin, $C_{15}H_{10}O_7$, glucose and rhamnose according to the equation:—

$$C_{27}H_{30}O_{16} + 2H_2O = C_6H_{12}O_6 + C_6H_{12}O_5 + C_{15}H_{16}O_7$$

The drug also contains *choline*.

Glycerin in Soap, Determination of. E. Martin. (*Moniteur Sci.* [4], **17**, 797.) Ten Gm. of soap is dissolved in about 50 c.c. of warm water; the fatty acids are liberated with an excess of dilute H_2SO_4, heat being continued until they have melted. The mixture is then filtered through a wet filter, and the fat washed with boiling water on the filter. The filtrate is then precipitated with excess of basic lead acetate, and after standing for half an hour, filtered into a graduated 250 c.c. flask. The precipitate is washed, excess of lead removed with H_2SO_4, and the volume of the liquid made up to 250 c.c. Twenty-five c.c. of the clear solution is then transferred to a conical 300 c.c. flask and treated with 25 c.c. of a solution of $K_2Cr_2O_7$ containing 74·565 Gm. per litre; 20 c.c. of 50 per cent. H_2SO_4 is added and the flask is left in the boiling water-bath for 30 minutes. The glycerin is thus entirely decomposed. After cooling, the excess of $K_2Cr_2O_7$ is titrated back with a solution of ferrous ammonium sulphate containing 160 Gm. of the double salt and 20 Gm. of H_2SO_4 per litre, the end reaction being determined in the usual way by spotting out with freshly prepared $K_6Fe_2CN_{12}$ solution, the two standard solutions having been previously set in the same manner. When V = the number of c.c. of the iron solution equivalent to 25 c.c. of $K_2Cr_2O_7$ solution, and v = the number of c.c. of iron solution used up, the percentage of glycerin $= \frac{V - v}{V} \times 25$. This method serves to determine the free glycerin. If neutral fats be present in the soap (as in a "superfatted" soap) these must be saponified, decomposed with acid, and another determination of the total glycerin performed in the above manner. The difference of the total and free glycerin will give the combined glycerin. [The absence of sugar must be ensured, otherwise erroneous results will be obtained. Many of the transparent so-called "glycerin" soaps contain a notable quantity of sugar.—Ed. *Year-Book.*]

Gommier resin, or West Indian Elemi, from Dominica. (*Bull. Imp. Inst.*, **2**, 224.) This fragrant resin, which is collected by the natives and used locally for the preparation of torches and as incense, exudes either from natural fissures or from cuts made in the bark; it is at first an opaque, whitish, highly viscous liquid, which soon dries into soft yellowish lumps, and eventually

into hard, brittle masses of white resin; it is in the latter form that it is usually collected.

Small consignments of the material have been sold in European markets from time to time, principally as a substitute for true elemi. On account of its general resemblance to true elemi, gommier resin is commonly known as "dry," or West Indian elemi.

The present consignment of gommier resin consisted principally of large flattened lumps of hard resin, somewhat dirty externally, but snow white internally. When examined under the microscope these lumps were found to consist almost entirely of a substance crystallizing in minute needles. There was also present a small proportion of lumps of soft resin which was slightly yellow, and generally contaminated by pieces of bark, earth, small stones, etc. This soft resin was crystalline only on the surface.

The material had a pleasant aromatic odour, which was especially marked in freshly broken pieces of the softer resin.

As the hard and soft resin differed materially in composition, representative specimens of each kind were selected for analysis. The results are tabulated below :—

	Hard.	*Soft.*
Saponification value. . .	24·7	41·6
Acid value	14·1	37·3
Ester value	10·6	4·3
Ash	0·08%	0·36%
Melting point . .	158–164°	Below 100°C.

The hard resin is completely soluble in alcohol, and partially so in turpentine oil, whilst the soft resin is entirely soluble in turpentine oil and only partially so in alcohol.

Grass Oils, West Indian. E. J. Parry. (*Chem. and Drugg.*, 63, 507.) The oil from *Andropogon nardus*, cultivated in Jamaica, is a pale oil of exceptionally fine odour, and has the following characters : Sp. gr. at 15°C., 0·8955 ; rotation, 100 mm., −3° 30′ ; refractive index at 20°C., 1·4712 ; aldehydes, 25 per cent. ; geraniol and citronellal, 87 per cent.

In general it appears to closely resemble fine Java citronella oil, being of much finer odour than the normal Ceylon distillates. It is soluble in 1 volume of 80 per cent. alcohol, and on addition of 10 volumes shows only the faintest opalescence. If it could be produced at a reasonable price in quantity, it would no doubt

find great favour in this market. Schimmel and Co. have reported on what appears to be the same oil, and say that it takes about an intermediate place between the Java and Ceylon oils; but the author is of opinion that it is more of the Java type than of the Ceylon.

The Jamaica oil distilled from *A. schœnanthus* is not a palmarosa oil, and is accurately described as a true lemongrass oil. This raises the question as to which grass is really the parent of lemongrass oil, as it appears out of the question that so enormous a change in the character of the product could take place by the grass being cultivated in Jamaica.

This lemongrass oil has the following characters: Sp. gr. at 15°C., 0·8965; rotation, 100 mm., −0° 30′; aldehydes, 83 per cent.; refractive index at 20°C., 1·4896; insoluble in 70 per cent. or 80 per cent. alcohol.

The oil is a typically fine lemongrass oil, with a very high aldehyde content, and differs only from normal Eastern oils in its insolubility in alcohol. Apart from this insolubility, which may not be normal, and may be found to disappear when the oil is distilled under proper conditions, the oil is of excellent quality, since the value of lemongrass oil depends entirely on its citral-content; this variety should command a ready market if produced at a reasonable price.

Specimens of the oil distilled experimentally from grasses cultivated in Trinidad were found by H. H. Cousins to have the following characters:—

—	*A. nardus.*	*A. schœnanthus.*
Sp. gr. at 15°C.	0·9084	0·9315
Rotation	+0·1°	+3°
Aldehydes	15·5 per cent.	48·2 per cent.

The oil from *A. nardus* showed a total geraniol and citronellal value of 53 per cent., and thus corresponds with an ordinary Ceylon citronella oil, except that its content in active constituents is somewhat low. This, however, is possibly accidental, and with proper distillation a normal oil would no doubt result. The *A. schœnanthus* oil does not in the least resemble a palmarosa oil, but much more closely resembles lemongrass oil.

Guaiacum officinale, Saponins of. W. Friboes. (*Pharm.*

Zeit., **48**, 626.) Four distinct saponins have been isolated from *Guaiacum officinale*. Two have been located in the wood and bark, both of the stem and root, which the author has named *guaiacsaponic acid* and *guaiacsaponin*. Both these are devoid of toxic action on warm-blooded animals, but are poisonous to fish even in the proportion of 0·05 per cent. The leaves contain two other saponins, similar to the above, but not identical with them.

Gurjun Balsam, Constituents of. A. Tschirch and L. Weil. (*Archiv der Pharm.*, **241**, 372.) Gurjun balsam, as met with in commerce, contains about 80–82 per cent. of essential oil, 16–18 per cent. of indifferent gurjoresene, $C_{17}H_{28}O_2$, and two resin acids, one soluble in sodium carbonate, which is crystalline; the other amorphous, which is soluble in ammonium carbonate. The neutral body described by Hirschsohn is identified as gurjuresinol, $C_{15}H_{26}O$, and is identical with commercial copaivic acid and with Mach's metacholestol; the other crystalline body, gurjuturboresinol, $C_{20}H_{30}O_2$, is the copaivic acid of Merck and Tromsdorff's metacopaivic acid.

Gymnema sylvestre, Lævo-rotatory Quercitol from the Leaves of. F. B. Power and F. Tutin. (*Proc. Chem. Soc.*, **20**, 87.) Quercitol, $C_6H_{12}O_5$, as hitherto found in the dextro-rotatory form from certain acorns, has now been isolated in the lævogyre state from the leaves of *Gymnema sylvestre*, an Asclepiadaceous plant occurring in Banda and the Dekkan. Lævo-quercitol crystallizes from water in colourless crystals, having the formula $C_6H_{12}O_5.H_2O$. It loses its water at 110°C., melts at 174°C., and has the $[a]_D - 73·9°$. The dried substance separates from alcohol in the anhydrous state. It forms a pentacetyl derivative, $C_6H_7(O.C_2H_3O)_5$, m.p. 124–125, $[a]_D - 26·0°$, a pentabenzoyl compound, $C_6H_7(O.C_7H_5O)_5$, crystallizing with a molecule of alcohol in the presence of that solvent; m.p. 148°C.; $[a]_D - 79·0°$. When oxidized with sodium hypobromite the product gives, with phenyl-hydrazine, the compound di-keto-tri-hydroxy-hexahydrobenzene-dihydrazone, $C_6H_5(OH)_3$ $(:N.NH.C_6H_5)_2$ in yellow needles, m.p. 209°C. When permanganate is used as the oxidizer, malonic acid is obtained.

Gynocardia Oil. J. Schindelmeiser. (*Berichte Pharm.*, **14**, 164.) The oil obtained by cold pressure from the seeds was yellowish and solid, having the m.p. 26°C.; the opt. rot. in 35·7

per cent. ethereal solution was $+10{\cdot}28°$; it was soluble, with turbidity in most solvents; acid value, 25·04; saponification value, 232·4; iodine value, 92·45. *Gynocardic acid*, $C_{21}H_{40}O_2$, obtained by the method of Petit, had the following characters: M.p. 29·5°C., $[\alpha]_D$ +39·90°; iodine value, 94·18; acetyl value, 168·13. It belongs to the fatty acid series $C_nH_{2n}-_2O_2$, and probably contains the group $R_1R_2CH.COOH$. Crude gynocardia oil contains besides palmitic, hypogeic and coccinic acids and oxyacid. (See also Chaulmoogra Oil, *ante*, p. 48.)

Gynocardin, A New Cyanogenetic Glucoside. F. B. Power and F. H. Gornall. (*Proc. Chem. Soc.*, **20**, 137.) In the course of an examination of the seeds of *Gynocardia odorata* (R.Br.), it was observed that when these were bruised and brought into water a strong odour of hydrogen cyanide is developed. This is due to the presence of a cyanogenetic glucoside, which the authors have isolated in a crystalline state, and designate *gynocardin*. It is very soluble in water, less freely in alcohol, and crystallizes from these solvents in colourless needles which melt at 161–162°C. with slight decomposition, and have $[\alpha]_D$ at 19°C. $+37{\cdot}1°$; it gave on analysis the following percentages: C = 48·0; H = 5·8; N = 4·3. Its constitution is being determined.

Helichrysum angustifolium, Essential Oil of. (*Schimmel's Report, Oct.*, **1903**, 76.) The herb which is common and widely distributed in S. Europe has a pleasant odour. The dried material yielded 0·072 per cent. of a yellowish-brown essential oil; sp. gr. 0·9182; $[\alpha]_D$ +0° 40′; acid number, 14·4; ester number, 118·16. It gave a clear solution in alcohol 90 per cent., which subsequently became cloudy through separation of paraffin. This melted at 67°C.

Hermophenyl, Reactions for. E. Barral. (*Journ. Pharm. Chim.* [6], **18**, 207.) Although it contains 40 per cent. of mercury, the metal is not detectable by ordinary reactions in hermophenyl until the molecule is completely broken up. It is not coloured by H_2SO_4 in the cold; when heated with that acid it gives a yellow colour, changing to orange. Berg's reagent gives an amethyst-red colour in the cold, becoming orange-red, with a brown precipitate, on warming. Froehde's reagent gives a yellow colour with hermophenyl, passing subsequently to orange yellow, yellowish-brown, brown, and finally amethyst-red. Sodium persulphate gives a slight rose colour in the cold, which

becomes yellow on warming; the addition of caustic alkali to the cooled liquid then gives a yellow precipitate of HgO. A few particles of hermophenyl, sprinkled Mandelin's reagent, give deep indigo striæ as they dissolve; the liquid becomes deep greenish-blue; on warming, the blue tint passes to emerald-green when near the boiling point. This reaction is characteristic and very sensitive. Formalin and H_2SO_4 give a very deep red-brown with hermophenyl, when warmed.

Herniara glabra, New Glucoside in. — Grein. (*Pharm. Zeit.*, **49**, 257.) *Herniara glabra* contains from 0·09 to 0·18 per cent. of a crystalline glucoside, *herniarin*, $C_{34}H_{59}O_{19}$, which was isolated by treating the powdered herb with an equal weight of moist lead hydrate, and percolating the mass with dilute alcohol. After evaporating the alcohol, the aqueous extract was set aside, when the impure glucoside separated; this was purified by treatment with absolute alcohol and animal charcoal, and precipitated from the colourless filtrate by means of ether. It melts at 228-231°C. It gives a yellow colour when triturated with H_2SO_4, which becomes rose, and finally red. It is hydrolized by simply boiling with water into glucose and herniaric acid, $C_{28}H_{49}O_{14}$. This acid is probably the diuretic principle of the drug.

Hopea odorata Resin from Burmah. (*Bull. Imp. Inst.*, **2**, 23.) A sample of this resin, known in Indian commerce as rock dammar, forwarded to the Imperial Institute consisted of large, irregularly-shaped tears of a yellow colour, possessing a brilliant, irregular fracture, and a slight aromatic odour. The resin melted at 115°C., and yielded 0·56 per cent. of ash. Its saponification value was 37·1, acid value, 31·5, and ester value, 5·6. It was completely soluble in turpentine oil and partially so in alcohol. It may be classed commercially as a second quality dammar.

Hyptis spicata, Essential Oil of. (*Schimmel's Report, May*, **1904**, 96.) The labiate *Hyptis spicata* (*Mesosphærum spicatum*), which grows profusely in Florida, gave about 0·005 per cent. of a bright yellow oil with a faint mint-like odour, having the following characters: Sp. gr. at 15°C., 0·915; $[\alpha]_D$ 27° 25′; acid number, 2·7; ester number, 4·35; insoluble in 10 volumes of alcohol 80 per cent.

Inula viscosa, Essential Oil of. (*Schimmel's Report, Oct.*,

1903.) The leaves of the plant, which occurs throughout the Riviera, are used as a popular remedy for snake bite. The whole plant is viscid and aromatic. When dried it yielded 0·062 per cent. of a dark-brown viscid oil; sp. gr. 1·006. at 25°C.; acid number, 164·63; ester number, 15·77. At ordinary temperatures it deposits a quantity of paraffin. The fatty acids isolated from it were fluid.

Iodine Tincture and Liniment, Determination of Alcoholic Strength of. F. H. Alcock. (*Pharm. Journ.* [4], **18,** 9.) Take a convenient quantity of the liquid, and shake with an excess of metallic mercury; combination is very rapid, mercuric iodide being produced, which dissolves in the potassium iodide to a colourless solution or nearly so, if B.P. spirit has been used. When methylated spirit has been used the colour of the solution is dark yellow, and by this means its presence can be detected. In early experiments the distillation was then proceeded with in the usual way, when it was found that the distillate always contained small but distinct quantities of mercuric iodide, thereby vitiating the sp. gr. results. The difficulty was afterwards readily overcome by the addition, after complete chemical change has been effected, of a small quantity of solution of potassium or sodium hydroxide.

Ipecacuanha, Determination and Separation of the Mixed Alkaloids in. A. G. C. Paterson. (*Pharm. Journ.* [4], **17,** 102.) Weigh off 12 Gm. of powdered ipecacuanha root: add to it 10 c.c. of ammonia solution (or 10 c.c. of sodium carbonate solution, 1 in 3); 120 Gm. (or c.c.) of a menstruum composed of chloroform, 1 part; amyl alcohol, 1 part; ether, 3 parts. Agitate in a stoppered bottle during 1 hour, then add water (10–15 c.c.) to aggregate the powder. The amount will be variable, owing to various degrees of fineness of powder. Next separate 100 Gm. (or c.c.) of the ethereal liquid and evaporate to one-half if ammonia has been used. Extract the alkaloids with (1) 15 c.c. (or excess) of N/10 hydrochloric acid; (2) water 5 c.c.; (3) 5 c.c.; (4) 5 c.c. Add excess of normal potash solution (about 2 c.c.) and wash four times with ether 15 c.c., 10 c.c., 10 c.c., and 5 c.c., reserving both aqueous and ethereal layers. Mix the ethereal solutions and wash three times with N/20 potash solution, 10 c.c., 5 c.c., 5 c.c. Then mix the N/20 potash solutions and wash once with ether, 10 c.c. Next mix all the ethereal solutions, evaporate, weigh the residue or titrate

as emetine (1 c.c. N/10 acid = 0·0248 Gm. emetine.) Finally mix the aqueous solutions, acidify with hydrochloric acid, make alkaline with ammonia, and extract the alkaloid with heavy ether-chloroform (1 : 6) 20 c.c., 10 c.c., 10 c.c., 5 c.c., or till all the alkaloid is extracted. Evaporate and weigh, or titrate the residue as cephaeline (factor 0·0234).

The titrations can be satisfactorily conducted by Bird's method, using methyl-orange as indicator. Ether-chloroform was found to extract the cephaeline more rapidly than ether alone, and therefore replaces the ether used in previous experiments at that stage of the process.

Jasmin, Essential Oil of, Further Notes on. A. Hesse. (*Berichte*, **37,** 1457.) Jasmin flower extract is found to contain no free methyl anthranilate as such, but when it is distilled to free it from non-volatile constituents, an estimable quantity, 0·4 per cent., appears in the distillate. It would appear, therefore, that the flowers contain a complex body which is decomposed by distillation or enfleurage. With respect to the occurrence of indol, it was found that when two extractions were performed, one shortly after the other, the first gave an oil containing no indol, while the product of the second extraction contained 2 per cent. of that body. Evident indol also is the result of the splitting up of some complex constituent of the flowers, possibly of a glucosidal nature. (See also *Year-Books*, **1901,** 74; **1902,** 97, 278.)

Kilangit, an Indian Fish Poison. H. W. Bettink and J. L. Heyl. (*Pharm. Weekblad*, through *Pharm. Journ.* [4], **17,** 549.) The plant yielding the fish poison used in the Indian Archipelago, and known as kilangit, is supposed to be *Polyscias nodosa*, an Araliaceous plant, but it is possible that more than one plant is used under this name. The leaves are usually reduced to coarse powder, mixed with wood ashes and then thrown into the water. The leaves contain a body having the physical characters of a saponin, and when treated with dilute acid afford a sapogenin, insoluble in water. This, with sulphuric acid, gives a purple coloration, which, in contact with bromine vapour, becomes violet. The leaf-stalks do not appear to contain any appreciable quantity of saponin.

Kino-tannic Acid, Constitution of. E. White. (*Pharm. Journ.* [4], **17,** 702.) It has previously (*Year-Book*, **1903,**

104) been shown that kinoin does not exist in Malabar kino, and that, therefore, kino-tannic acid cannot be an anhydride of methoxypyrocatechin and gallic acid. Attempts to prepare the acid or its derivatives in a crystalline form have been unsuccessful. Fractional precipitation of the alcoholic solution by means of ether gave no definite results, and a series of fractional precipitation of aqueous solutions with aqueous and gaseous HCl gave products which were not of definite composition as shown by the results of ultimate analysis. Kino-tannic acid does not readily acetylize, nor are the products obtained by the process crystalline. It benzoylates freely by Schotten-Baumann's method, the product, produced in a current of hydrogen to avoid oxidation, being a salmon-pink amorphous body. The product of methylation was also amorphous. Probably in commercial kino, the process of oxidation by the oxydase ferment it contains, has proceeded so far that it is not possible to isolate definitely the original constituents.

Kola Nut, Guarana, Tea and Coffee, Assay of. E. Léger. (*Journ. Pharm. Chim.* [6]. **18**, 57.) *Kola Nut.* A small portion of the powdered drug is dried at 100°C., to determine the percentage of moisture. This known, a quantity of the original powder, equivalent to 15 Gm. of the dry substance, is weighed off and mixed in a mortar with calcined magnesia, 10 Gm., and water, 15 c.c. The moist homogeneous mass is introduced into a 500 c.c. flask which is then corked and set aside for 2 hours. 150 c.c. of $CHCl_3$ are then added, and the flask, with its contents, is weighed. It is then connected with a reflux condenser and boiled for an hour. After cooling, the whole is made up to the original weight with more $CHCl_3$, and filtered into a graduated 100 c.c. flask, the funnel being covered during the process to avoid loss by evaporation. When the passage of the fluid ceases, the funnel is tapped to allow more filtrate to run through; in this way the 100 c.c. of filtrate, equivalent to 10 Gm. of the original powder will be readily collected. This chloroformic extract is then distilled, in two separate portions, from a small flask, and the residue dried at 100°C., the heat being gently raised at first to prevent loss by decrepitation. The almost colourless residue is then treated with 12 c.c. of a mixture of HCl,1, and water, 2, and agitated in the flask, previously closed with a rubber cork. The alkaloids are thus dissolved, while the wax and fat remain insoluble. The solution is passed

through a small filter, and 10 c.c. are collected in a small graduated separator (an Adams' separator for the determination of fat in milk is well adapted for the process); 20 c.c. of $CHCl_3$ is added with an excess of AmOH, and the liberated alkaloids are shaken out in the usual manner, the colourless chloroformic extract being run off into another small separator. The ammoniacal aqueous solution is shaken out twice more, using 20 c.c. of $CHCl_3$ for each washing. The chloroformic extracts bulked in the second separator are washed with 2 c.c. of water, and the separated clear $CHCl_3$ layer distilled in two portions in a small tared conical flask, a few grains of charcoal of known weight having been added to prevent bumping or spurting. The residue is then dried at 100°C., the flask being inclined to allow the $CHCl_3$ vapour to escape. When the weight is constant, the amount $\times 12$ gives the percentage of total alkaloids, since of the 12 c.c. of alkaloidal solution originally obtained only 10 c.c. were extracted in the final stage. The yield should not be less than 1·25 per cent.

Guarana. The process is similar to the above, but the drug being richer in caffeine, it is necessary to take only 9 Gm. of the dry, or its equivalent of the moist, powder. This is treated with MgO, 6 Gm., and H_2O, 10 c.c. The quantity of $CHCl_3$ to extract with is reduced to 90 c.c., of which 60 c.c. is collected as filtrate, equivalent to 6 Gm. of the drug. The crude alkaloids are redissolved in 12 c.c. of acid liquid; 10 c.c. of this is collected as filtrate. The final weight $\times$ 20 gives the percentage of alkaloids. This should be about 4 per cent.

Tea. The first part of the process is conducted precisely as described under kola nut. The 100 c.c. of chloroformic extract is distilled in two portions until only a green syrupy residue is left. This is treated with 20 c.c. of petroleum ether, and 25 c.c. of a mixture of HCl, 1, and water, 4; after closing the flask with a rubber stopper the whole is shaken up and transferred to a separator. After separation, the acid layer is withdrawn and the green petroleum ether washed first with 15 c.c., then with 10 c.c. of the same acid mixture. The petroleum ether layer is then rejected. The acid aqueous solutions are bulked in another separator and shaken out again with 5 c.c. of petroleum ether. After separation the aqueous liquid is transferred to the first separator previously emptied and rinsed. Excess of AmOH is added and the alkaline liquid shaken out with 60 c.c. of $CHCl_3$ in three successive extractions. The $CHCl_3$ extracts are bulked

in another separator and washed with 2 c.c. of water. After separation, the $CHCl_3$ layer is distilled in two successive portions in a small tared conical flask. The residue, dried to constancy at 100°C., is weighed. The amount of caffeine thus obtained should not be less than 2 per cent.

Coffee. The first stage of the process is similar to that described for kola nut. After distilling off the 100 c.c. of $CHCl_3$ extract (equivalent to 10 Gm. of the original coffee) the residue is treated with 24 c.c. of distilled water, the flask closed with a rubber cork and heated on the water-bath to 60-65°C. The mixture is then strongly agitated, cooled, and filtered through a small filter, 20 c.c. being collected. This is shaken out with $CHCl_3$, 60 c.c. in three successive portions, the bulked $CHCl_3$ extracts distilled from a small tared conical flask, the residue dried at 100°C. and weighed. The weight × 12 gives the percentage of caffeine. Since coffee contains less caffeine than the other substances, it is not necessary to use acid water to redissolve the first alkaloidal residue. The quantity of plain water prescribed is ample to dissolve all the alkaloid likely to be present. By this treatment the base is obtained purer than if acidified water were employed.

Lactase and Emulsin. E. Bourquelot and H. Hérissey. (*Journ. Pharm. Chim.* [6], **18,** 151.) The nucleus of various Rosaceous seeds, almonds, apple pips and peach kernels are found to contain both lactase and emulsin, since solutions of the constituents of these have the power of increasing the rotation of solutions of lactase, due to the formation of glucose and galactose. The leaves of *Prunus lauro-cerasus*, however, are found to be free from lactase, containing only a small quantity of emulsin. Kephir ferment is, further, free from any hydrolizing action on amygdalin. This ferment is, therefore, lactase alone, not accompanied by emulsin. These results show that not only are the ferments distinct, but that they occur both together and separately in nature.

Lactuca virosa, the Disputed Presence of Mydriatic Alkaloid in. E. H. Farr and R. Wright. (*Pharm. Journ.* [4], **18,** 186.) About 1,000 Gm. of the fresh herb supplied to the authors by J. O. Braithwaite, who, in conjunction with H. E. Stevenson, had previously (*Year-Book*, **1903,** 588) been unable to obtain evidence of mydriatic action therefrom, yielded the authors the small amount of 0·6 Mgm., or 0·0006 per cent.

of alkaloid which had a decided mydriatic action. The statement of Dymond as to the existence of the mydriatic base is therefore confirmed, and the failure of Braithwaite and Stevenson to extract the same is attributed to the use of ether as the immiscible solvent, which, in view of the extremely minute quantity present (equivalent to 0·00024 Gm. in the 400 Gm. of fresh herb used by them), would not be removed, as had been previously found by the authors (*Pharm. Journ.* [3], 22, 471) to be the case with belladonna. The authors employed chloroform as the immiscible solvent for shaking out the base, as follows:—

About a kilogramme of the herb was dried, the product reduced to coarse powder, and exhausted with 50 per cent. alcohol. The tincture was slightly acidified and evaporated over a water-bath until all the alcohol had been dissipated. The aqueous liquid was then filtered and the filter washed with water, the washings being added to the filtrate. The liquid was further concentrated by evaporation until the volume was reduced to about 25 c.c. The product was transferred to a separator, a slight excess of ammonia added, and the alkaloid shaken out with four successive 5 c.c. of chloroform. These were drawn off in turn and bulked, and the alkaloid removed by shaking with three successive 10 c.c. of distilled water containing 1 per 1,000 dilute sulphuric acid. The mixed acid solutions were rendered slightly alkaline with ammonia and the alkaloids again shaken out with chloroform. This process of purification was carried out three times in all, the alkaloids being finally obtained in a perfectly colourless solution in chloroform. The chloroformic solution was transferred to a flat-bottomed glass dish and the chloroform allowed to evaporate at a low temperature. A mere trace of residue was obtained, presenting the appearance of a film on the bottom of the dish. When examined by a lens, however, it was seen to be distinctly crystalline. It weighed only 0·6 Mgm. It was dissolved in 3 or 4 drops of very slightly acidulated water, and the solution thus obtained, tested in drops placed on a glass slab, was quite sufficient to give a characteristic alkaloidal reaction with Thresh's and Mayer's reagents. Moreover, a drop of the same solution introduced into the eyes of two individuals produced a very powerful mydriatic effect, the pupil in one case being dilated almost to the full extent of the iris.

The following process was employed for the isolation of the alkaloid from the extract:—

Five Gm. of the latter was weighed out and rubbed down in a mortar with enough slightly acidulated water to form a cream. Fifty c.c. of absolute alcohol was added, the mixture well stirred and set aside until the mucilaginous matter had completely subsided. The liquid portion was poured off and filtered. The deposit was then rubbed to a cream with slightly acidulated water and the treatment with alcohol repeated. The two alcoholic filtrates were mixed, 20 c.c. of distilled water added, and the mixture evaporated in a porcelain dish over a water-bath to small bulk. The residual liquor was transferred to a separator and the alkaloids recovered and purified, as in the previous experiment.

The product was a white crystalline residue weighing 1·4 Mgm. It was dissolved in a little slightly acidulated water, and the solution gave alkaloidal reactions with Mayer's and Thresh's reagents, and, when instilled into the eye, produced a powerful mydriatic effect.

These experiments may therefore be taken to confirm the results of Dymond, so far as they relate to the presence of a mydriatic alkaloid in *Lactuca virosa* and an extract prepared therefrom.

Lard, Occurrence of Pure, with High Iodine Number. W. D. Richardson. (*Journ. Amer. Chem. Soc.*, **26,** 372.) The U.S. Board of Agriculture has fixed the limit of 60 for the maximum iodine absorption figure for pure leaf lard. Although the author finds that this figure is high enough to cover the bulk of the pure leaf lard at present met with in commerce, he calls attention to the fact that a higher iodine absorption does not necessarily indicate adulteration. It is found that pure leaf lard from oily hogs may have a Huebl figure ranging from 78·8 to 82, the back fat from the same giving even higher results, 81·5–84·7. These are known as "mast fed" hogs, and are allowed to feed in a semi-wild condition in the woods, whereas the hogs generally supplied for market are pen-fed on corn for some time prior to the slaughtering. The lard of these latter is harder, and its iodine figure does not exceed the official limit.

Laurus nobilis, Essential Oil of the Leaves of. H. Thoms and B. Molle. (*Archiv der Pharm.*, **242,** 161.) *Laurus nobilis* leaves yield from 1 to 3 per cent. of an aromatic yellow

oil with an acid reaction and a sharp taste. The oil examined had the $[\alpha]_D - 15{\cdot}95°$ at 17°C. and the sp. gr. 0·9215 at 17°C. A specimen a year older had the sp. gr. 0·9257 at 17°C. Methyl chavicol, found by Wallach in this oil, was not detected by the authors. The acid reaction is due to the presence of acetic, isobutyric and valerianic acids. Eugenol is present to the extent of 1·7 per cent. The esters present are those of acetic, valerianic, and caproic acids. Besides these a solid acid, having the constitution $C_{10}H_{14}O_2$, crystallizing in glittering scales which melt at 146–147°C., was isolated. Pinene is present with about 50 per cent. of cineol; geraniol was found in the fraction boiling between 212–230°C. The higher boiling portion contains a sesquiterpene and a sesquiterpene alcohol. The original oil, and also its higher boiling fractions, give in acetic acid solution an intense blue colour with bromine vapour or with a trace of nitric acid.

Lavender Oil, English, and its Official Specific Gravity. J. C. Umney. (*Chem. and Drugg.*, **63,** 825.) The methods of distillation of lavender oil in vogue, both in the South of France and also in the Mitcham district of Surrey, may be described as primitive. Distillations are conducted much in the same way as they have been for the last fifty years. It is the custom of the large distillers at Mitcham to separate lavender oil distillates into two portions, this separation not being based upon any definite characters, but upon practical experience, since the last runnings of the still are not so pleasant as the first, although the portions set aside as "second runnings" are anything but uniform. It comes about, therefore, that many of the English oils are not normal distillates of lavender—that is to say, they are not the whole of the essential oil distilled from lavender, but, in a sense, fractionated oils, which in many instances have a sp. gr. below 0·885. Operating upon a charge of 1½ ton of Mitcham lavender, freshly cut, with 1,200 gals. of water, and allowing the distillation to proceed for 3 hours (which is the usual time-method adopted), and subsequently pushing the distillation to a finish, distillates are obtained which are divided into two parts, the second fraction varying from 4 to 8 per cent. of the final oil obtained. The oils distilled in the years 1901, 1902, and 1903 were examined, and the sp. gr. of these oils, with their percentages of esters calculated as linalyl acetate, are set out in the following table :—

—		Sp. gr. at 15°C. when first examined.	Present Sp. gr.	Present percentage of Esters.
1901	1st distillate	0·881	0·886	6·2
	2nd ditto	0·884	0·889	7·3
1902	1st distillate	0·882	0·885	8·1
	2nd ditto	0·887	0·890	12·0
1903	1st distillate	0·881	0·881	8·2
	2nd ditto	0·889	0·889	12·0

From this it will be seen that the idea that the sp. gr. of the oil increases on keeping, which has been long accepted, is confirmed. When freshly distilled the so-called "first runnings" rarely possess as high a sp. gr. as is required by the British Pharmacopœia, although after keeping for 2 or 3 years the oil having an original sp. gr. of 0·881 appears to rise to 0·885 or 0·886.

It will be seen from the figures quoted that the percentage of esters contained in the second fractions is higher than in the first. This is what one would expect taking into consideration the relative boiling-points of the constituents, but, judged by smell, in every instance the second fraction is decidedly less pleasant than the first, the selection of the products as practised by the distillers for trading purposes being fully confirmed. The difference in these fractionated distillates, however, is due rather to the presence of decomposition products in the second.

Samples of lavender oil distilled from fresh lavender grown in other districts have been examined, observations having been made for 5 years on the annual products from lavender grown at Elsenham, where the soil is strong clay with some chalk.

The sp. gr. of those soils (not divided into two portions on distillation) examined were as under :—

1897	sp. gr. at 15°C.	0·891
1898	ditto	0·889
1899	ditto	0·891
1900	ditto	0·888
1901	ditto	0·885

In every instance it will be observed that with these oils the sp. gr. are as required by the British Pharmacopœia.

From these characters, and also from further observations, it would appear that soil has a distinct influence upon the characters of lavender oil, especially the sp. gr., since oil distilled

from lavender grown at Warlingham, in precisely the same stills and in the same manner as that from lavender grown at Mitcham has a distinctly higher sp. gr. The soil at Warlingham is strong loam on clay, whilst the soil in the Mitcham district, upon which these particular observations were made, was light loam on chalk. There is also a little difference in the altitudes, although not anything really very material, Warlingham being about 400 feet higher than Mitcham and Ewell, whilst Elsenham is about 360 feet above sea-level.

It would be better to reduce this sp. gr. limit to 0·883, and even this, with the other characters, would still practically ensure an unsophisticated oil.

In the meantime, when judging English lavender oils it is obviously necessary to take into consideration not only the physical and chemical characters as shown by analysis, but also the sweetness of odour.

Lead in Acetic Acid and Ammonium Acetate. C. T. Bennett. (*Chem. and Drugg.*, **63,** 436.) Practically all commercial samples of acetic acid contain traces of lead. This is not evident until the acid has been neutralized, when the reaction with sulphuretted hydrogen is very marked, although the coloration produced in the acid itself is barely perceptible. The reaction is particularly noticeable in the concentrated solutions of ammonium acetate (1–4 and 1–7) of trade, a number of samples of which have been recently examined with a view to determine the proportion of lead present. Although the quantity of lead in the worst sample did not exceed 1 in 10,000, this proportion appears somewhat alarming, unless the small dose of these concentrated solutions be borne in mind.

As it is stated that no lead plant is used in the preparation of acetic acid, it would appear that the source of the contamination is the storage-vessels (usually carboys).

With hydrochloric and sulphuric acids, neutralized with ammonium carbonate, it was found that while the hydrochloric acid was practically lead-free, the sulphuric acid gave a distinct reaction for lead, though rather less than its equivalent of acetic acid.

The method adopted for the estimation of the proportion of lead consists in matching the colour produced by 1 c.c. of neutral acetate solution and 40 c.c. of solution of sulphuretted hydrogen, with a standard solution of lead acetate under the same con-

ditions, using Nessler glasses. A close approximation can be thus obtained.

Lecithin of Egg, Fatty Acids of. H. Cousin. (*Journ. Pharm. Chim.* [6], **18.**) The fatty acids liberated from lecithin of egg yolk consist of linoleic acid 24 per cent.; oleic acid, 33 per cent.; palmitic acid, 28·5 per cent.; and stearic acid, 14·2 per cent.

Lemon Oil, Citral Content of. S. Gulli and H. Stavenhagen. (*Chem. and Drugg.*, **63,** 401.) The authors reiterate that the normal citral content of pure lemon oil, as determined by the sodium bisulphite method of Soldaini and Berté, lies between 7·0 and 7·3 per cent. To support this they adduce figures obtained with oils from different districts in Italy for 4 years. Oil showing less than 6·5 per cent. of citral is rarely met with, and is not accepted locally as being genuine.

Limes, Essential Oil of, Distilled, a New Sesquiterpene in. H. E. Burgess and T. H. Page. (*Proc. Chem. Soc.*, **20,** 62.) Lævo-terpineol forms a large proportion of the oxygenated constituents of distilled lime oil. The peculiar odour of the terpineol fraction is due to an isomeric liquid terpineol of slightly lower boiling-point. A new sesquiterpene, limene, of a partially olefinic nature, was also identified. It boils at 131°C. under 9 mm., and at 262–263°C. under 756 mm. It has the sp. gr. 0·873; is optically inactive; $[\eta]_D$ 1·4935 at 15°C., 1·4910 at 19·5°C. It gives a trihydrochloride, m.p. 79·80°C. This sesquiterpene is also present in hand-pressed lime oil.

Liquor Ferri Perchlor. Fort. F. H. Alcock. (*Pharm. Journ.* [4], **17,** 915.) Commercial specimens of this preparation are found to vary enormously in the amount of free acid present, one sample containing a large amount of free HNO_3. It is suggested that for medicinal use a more uniform product might be obtained by the solution of drained ferric hydrate in HCl, and that an official test for the quantitative determination of free acid should be given. After the addition of neutral Rochelle salt the titration may be readily performed with N/NaOH solution.

Magnesium, Lead and Zinc Carbonates, Official Chemical Formulæ for. J. G. Ferrier. (*Pharm. Journ.* [4], **18,** 586.)

Since magnesium carbonate after precipitation and during washing undergoes a process of hydrolysis in which the proportion of hydrate in the finished product tends to increase, while that of the $MgCO_3$ diminishes, it follows that magnesium carbonate has not the rigid chemical formula $3(MgCO_3)Mg(HO)_2 4H_2O$ attributed to it in the Pharmacopœia, the numbers of molecules of carbonate, hydroxide, and water being variable.

The same applies to the carbonates zinc and lead, both of which may contain varying ratios of hydroxide, carbonate, and water.

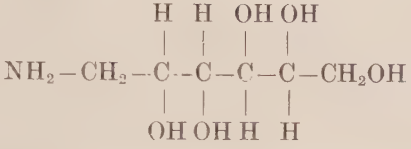
Magnolia kobus, Essential Oil of. (*Schimmel's Report, Oct.*, **1903.**) The essential oil distilled in Japan from the fresh leaves and branches of the Kobushi tree (*Magnolia kobus*) had an odour resembling that of sassafras oil. It had the following characters: Sp. gr., 0·9642; $[a]_D = -1° 6'$; acid number, 1·5; ester number, 8·87. It probably contains safrol. Citral in small quantity was also present.

Manganese in Zinc Sulphate. D. B. Dott. (*Pharm. Journ.* [4], **18,** 587.) Manganese is not mentioned among the impurities possibly present in zinc sulphate, as detailed in the official tests. In a sample received for examination, the presence of manganese was suspected from the colour of the ammonium sulphide precipitate. On testing with the borax and sodium carbonate beads, the amethyst and green colours respectively given confirmed the presence of manganese. A portion of the salt was dissolved in water with a little sodium acetate, and the solution, after addition of bromine water, was warmed. A dark brown precipitate quickly formed, consisting of manganese dioxide mixed with some iron oxide. The amount was approximately determined by ignition of the precipitated oxide, and found equal to 4·06 per cent. of crystallized manganese sulphate.

It would, therefore, seem desirable to include manganese among the possible impurities of zinc sulphate, in the tests of the British Pharmacopœia. It is suggested that the final clause of the official characters and tests should read, "It should yield . . . only the slightest reactions with the tests for iron, manganese, or chlorides."

Mannamine. E. Roux. (*Comptes rend.*, **138,** 503.) By

reducing mannosoxime, a new base, mannanine, amino-1-hexane pentol, $\frac{4\cdot5}{2\cdot3}6$.



has been obtained.

It resembles in general properties the isomers galactamine, arabinamine, and xylamine, previously described. It occurs as a colourless mass with a crystalline texture, which is very soluble in water. Its $[a]_D = -2°$. The neutral oxalate $(C_6H_{13}O_5NH_2)_2 C_2O_4H_2$, is the salt in which the base is isolated, since, although readily soluble in water, it is insoluble in absolute alcohol. It readily crystallizes from alcohol 60 per cent. in the form of brilliant lozenge-shaped lamellæ, melting at 186°C. Above that temperature it loses 1 mol. H_2O and becomes converted into dimannoxamide. The sulphate, $(NH_3C_6H_{13}O_5)_2SO_4$, the hydrochloride, $NH_2C_6H_{13}O_5HCl$, and other crystalline salts and compounds are fully described.

Mannite, Action of Phosphorous Acid on. P. Carré. (*Comptes rend.*, **137,** 517.) When phosphorous acid is heated with mannite, *in vacuo*, esterification takes place in two stages; the first, complete in about 3 hours, furnishes the phosphorous ester of mannite, $P_2(OH)_4O_2(CH_2)_2(CHOH)_4$. Further prolonged heating up to 100 hours finally furnishes another ester, that of phosphorous acid with mannide, $P(OH)_2O.C_6H_9O_3$. Both esters are monoacid to helianthin and phenolphthalein, and are unstable in aqueous solution, being slowly saponified by cold water. From the behaviour of mannite towards phosphorous acid the author concludes that its molecule contains two secondary alcohol groups, and not two primary functions, as stated by Fauconnier.

Melia azedarach, Fixed Oil of the Seeds of. J. Lewkowitsch. (*Analyst*, **28,** 342.) A specimen of this oil, known as Margosa, Veepa, or Neem oil, and veppam fat, is solid at ordinary temperatures, and has the following characters: Sp. gr. at 40°C. (water at 40°C. = 1). 0·9023; sp. gr. at 16°C. (water at 16°C. = 1), 0·91423; saponification value, 196·9; iodine value, 69·6; Reichert-Meissl value, 1·1; refraction in

butyro-refractometer, 52 "degrees"; "Titer" test of fatty acids, 42·0°C.

Melting Point, Determining, of Resins and Waxes. Kraemer and Sarthou. (*Nouv. Remèdes*, **19,** 327.) The following simple method for determining with some accuracy the melting point of resins, paraffins, waxes, and similar bodies is described: Twenty Gm. of the substance is carefully melted on an oil-bath, in a small capsule of such size that the melted liquid has a depth of 10 mm. An open glass tube having a diameter of 7 or 8 m. is dipped into the melted liquid; the upper end is then closed with the finger, and the contained liquid withdrawn and allowed to solidify. Five Gm. of mercury is then poured into the tube on top of the solidified cylinder of material. This is then suspended in a beaker containing cold water; a thermometer is so placed therein that its bulb is adjacent to the solid cylinder of the substance. This beaker is immersed in another of larger size, also containing water, which serves as the water-bath. The whole apparatus is now cautiously heated and the precise moment noted when the weight of the mercury column displaces the cylinder of wax or other substance under observation. This is taken as the melting point required.

Mentha citrata, Essential Oil of. (*Schimmel's Report, May,* **1904,** 95.) The oil distilled in Florida from the young plant without flowers had the following characters: Sp. gr. at 15°C., 0·8826; $[a]_D - 5° 55'$; ester number, 31·28, equivalent to 10·95 per cent. of linalyl acetate; solubility in alcohol 70 per cent., 1 : 2. The yield was 0·2 per cent. Although the plant is known in Florida as bergamot mint, the odour more nearly approaches that of lavender. The oil distilled from the frozen leaves was much richer in ester, the ester number being 111·28, equivalent to 38·95 per cent. of linalyl acetate.

Mercuric Chloride, Delicate Reaction for, in Calomel and other Mercurous Salts. A. Moulin. (*Union Pharm.*, **45,** 147.) A reagent is prepared by dissolving diphenyl-carbazide, 2 Gm., in alcohol 90 per cent., 100 c.c., and acetic acid, 10 c.c., making up the volume to 200 c.c. with water. A few drops of this reagent are added to the aqueous solution to be tested, such as the filtrate from calomel, followed by 10 c.c. of 10 per cent. sodium acetate solution. In the presence of $HgCl_2$ or other mercuric salt a characteristic blue colour is produced. The

test is sensitive to a dilution of 1 : 1,000,000. It is specially suitable to the detection of $HgCl_2$ in HgCl or of HgI_2 in HgI.

Mercury Methylarsenates. — Saint-Serin. (*Bull. Soc. Pharm. de Bordeaux*, **43**, 228.) *Mercuric Methylarsenate*, $CH_3.As.O\diamond Hg$ (O), is obtained in the form of permanent crystals by the double decomposition of $Hg2NO_3$ or $HgCl_2$ with sodium methylarsenate. Solutions of the salts in equivalent proportions are mixed and evaporated on the water-bath. The crystals of mercuric methylarsenate thus obtained may be washed with water without undergoing decomposition. The salt is not affected by light, and may be heated to 200°C. without showing signs of change ; at a higher temperature it turns yellow.

Mercurous methylarsenate, $CH_3.As.O\diamond Hg_2$ (O), is obtained by treating $HgNO_3$ with methylarsenic acid in equivalent proportions. A crystalline precipitate is gradually formed ; after 2 hours the supernatant liquid is decanted. The crystals are very fine prismatic needles, resembling quinine sulphate in appearance. They may be washed with a little water and dried on a porous tile. They are not affected by light, and may be heated to 300°C. without decomposing. Their solubility in water at 15°C. is 0·44 : 100° ; in boiling water, 1 : 1,000. The salt undergoes no change on contact with water. With NaCl solutions they are decomposed, giving a reddish yellow colour.

Mercury Oxycyanides. — Richard. (*Journ. Pharm. Chim.* [6], **18**, 553.) Most, if not all, of the so-called oxycyanides of mercury of commerce are found to be merely mercuric cyanide, $Hg(CN)_2$. The true oxycyanide, $Hg(CN)_2.HgO$, may be obtained by boiling together for 3 hours under a reflux condenser, mercuric cyanide, 100 ; yellow mercuric oxide, 70 ; distilled water, 2,000. After filtering out the excess of mercuric oxide, the oxycyanide is deposited as a white, micro-crystalline powder. This is collected, washed, and dried, first over H_2SO_4, then at 40–50°C. in the stove. Mercuric oxycyanide thus obtained is somewhat unstable, being decomposed at above 80°C., so that it cannot be recrystallized from boiling water. It is less soluble in water than $Hg(CN)_2$, which has the solubility

5·5 : 100; whereas that of $Hg(CN)_2.HgO$ is only 1·1 : 100. KOH and NaOH solutions do not colour it; but strong AmOH, which readily dissolves $Hg(CN)_2$, leaves an insoluble residue with $Hg(CN)_2HgO$, which consists mainly of HgO. By this action of ammonia a number of cyano-compounds may be obtained analogous to those given with AmOH and $HgCl_2$. The mother liquor from which $Hg(CN)_2HgO$ has been precipitated contains other compounds intermediate between that body and $Hg(CN)_2$.

Mercury Oxycyanides. E. Holdermann. (*Archiv der Pharm.*, **242**, 32.) Two oxycyanides are described in text-books, $HgOHg(CN)_2$, crystallizing in needles, and $3HgO{\cdot}Hg(CN)_2$, a white precipitate insoluble in water. In attempting to prepare the first salt, the author found that 3 molecular weights of $Hg(CN)_2$ were required. $HgCl_2$, 10 Gm., was dissolved in 250 c.c. of warm distilled water and precipitated with NaOH. The precipitate, thoroughly washed, was suspended in 120 c.c. and 26·6 Gm. of finely powdered $Hg(CN)_2$ gradually added; boiling was continued until the HgO was almost entirely dissolved, after filtering the oxycyanide, $HgO.3Hg(CN)_2$ crystallized out. No other compound was obtained by varying the proportion of the HgO or the $Hg(CN)_2$. The HCN in this compound was determined by decomposing it with an excess of magnesium dust, and distilling into a solution of KOH, the last traces of HCN being liberated by the addition of H_2SO_4 during distillation. The HCN is then titrated in the distillate, in the usual manner by Liebig's method.

Methyl Alcohol, Estimation of, in Presence of Ethyl Alcohol. T. E. Thorpe and J. Holmes. (*Journ. Chem. Soc.*, **85**, 1.) The process is based on the reaction which takes place when ethyl and methyl alcohol are treated with an oxidizing mixture of $K_2Cr_2O_7$ and H_2SO_4; under certain conditions the whole of the ethyl alcohol, except a small and proportionally constant part, is converted into acetic acid, the smaller part, equivalent to 0·5 per cent. of the alcohol present, into CO_2. In the case of methyl alcohol the results are totally different. No formic acid is produced as an ultimate product; the methyl alcohol is wholly decomposed into CO_2 and H_2O.

To determine methyl alcohol in the presence of ethyl alcohol the process is thus conducted: The sample is mixed with water so that it contains not more than 1 Gm. of methyl alcohol, or in the presence of ethyl alcohol not more than 4 Gm. of the mixed

alcohols. Fifty c.c. of this mixture is introduced into a 300 c.c. oxidation flask fitted with a ground stopper bearing a tapped funnel and having a side tube. Twenty Gm. of $K_2Cr_2O_7$ and 80 c.c. of dilute (1 : 4) H_2SO_4 are added and the mixture allowed to remain for 18 hours. A further quantity of 10 Gm. $K_2Cr_2O_7$ and 5 c.c. of H_2SO_4 (1 : 1) are then run in, and the contents of the flask heated for about 10 minutes to boiling-point, the evolved CO_2 being swept out of the apparatus by a current of air and collected in tared soda-lime tubes. When ethyl alcohol is present a deduction of 0·01 Gm. of CO_2 must be made for every Gm. of that alcohol in the mixture. A general method for determining whether tinctures or other medicinal preparations contain methylated spirit, and to what extent, is as follows: The spirit from 25 c.c. of the sample, or from 50 c.c. if it contain less than 50 per cent. of alcohol, is treated as described for the determination of alcoholic strength (*Year-Book*, **1903,** 23). The distillate of 100 c.c. thus obtained is diluted with water to 250 c.c.; 50 c.c. of this is taken and oxidized as above, and the weight of CO_2 determined. If this weight does not exceed 0·01 Gm. for each Gm. of alcohol present, it may be concluded that no methylated spirit is present. Should the weight exceed this amount, its equivalent in methyl alcohol by volume must be corrected by subtracting from 0·7 to 1 per cent., depending on the amount of methylated spirit present, the percentage of the latter being calculated on the assumption that the quantity of methyl alcohol in the dehydrated methylated spirit does not exceed 8·8 per cent.

Monarda didyma, Essential Oil of. J. W. Brandel. (*Pharm. Review*, **21,** 109, through *Schimmel's Report, Oct.*, **1903,** 48.) The presence of thymol in this oil, as recorded by others, has not been confirmed; neither that phenol nor carvol were found in the oil distilled from 100 lb. of the herb, which only yielded 14 c.c. of oil. This had the sp. gr. 0·902 and $[\alpha]_D - 10°$. The colour was light brown, the odour fragrant and balsamic.

Monarda fistulosa, Essential Oil of, Distribution in Different Parts of the Plant. J. J. Beck and J. W. Brandel. (*Schimmel's Report, Oct.*, **1903,** 48.) J. W. Brandel and E. Kremers have previously (*Year-Book*, **1902**, 112) recorded the presence of thymohydroquinone and thymoquinone in this oil. From the red colour of the essential oil of the glandular hairs of the corolla, the authors conclude that this is a solution

of thymoquinhydrone in carvol. The latter was identified by Flueckiger's reaction in the oil distilled from the dried petals, which gave 2·71 per cent. of a dark red oil. This had the sp. gr. 0·9586.

The leaves of the plant, free from petioles, gave a straw-coloured oil; sp. gr. 0·9241 at 20°C.; $[\alpha]_D - 0° 9'$. This contained carvol, but from its colour cannot contain thymoquinhydrone.

Monodora myristica, Essential Oil of. H. Thoms. (*Berichte Pharm.*, **14**, 24.) The fruits of *Monodora myristica*, from Western Africa, are used by the natives of New Guinea, Gaboon, and the Cameroons as a condiment. They yield 7 per cent. of essential oil on steam distillation. This is a pleasant-smelling yellow liquid with a greenish fluorescence, which does not deposit any solid matter, even when exposed to low temperatures. Its rotation is $-64° 16'$. It contains lævo-limonene and an alcohol, $C_{10}H_{16}O$, probably myristicol. It does not contain myristicin or other phenolic esters. It gives a green colour reaction with alcoholic Fe_2Cl_6, due to the presence of a body with a high boiling point.

Morphine, Determination of, in Opium. P. Schidrowitz. (*Analyst*, **29**, 144.) Six Gm. of opium (previously roughly powdered) are weighed into a small porcelain dish, 6 c.c. of distilled water is added, and the whole allowed to stand for about 15 minutes. The contents of the dish are then worked up to an homogeneous consistence with a pestle, and then transferred (by means of successive small quantities of water) to a 100 c.c. tared Erlenmeyer flask. The total weight of opium and water is then made up to 54 Gm. The flask, after corking, is shaken vigorously for 5 minutes, and is then allowed to stand for 1 hour, with an occasional brief shaking. The contents are then filtered through a plain filter, 10 centimetres in diameter, into a second tared 100 c.c. Erlenmeyer flask. If the filtrate does not run clear at first it must be returned. When exactly 42 Gm. of filtrate have been collected, filtration is stopped. Next, to the 42 Gm. of filtrate exactly 2 Gm. of a 50 per cent. solution of salicylate of soda in water is added; the whole is then shaken for about half a minute, and immediately filtered as before. Of the filtrate 36 Gm. is collected, and to this is added 15 c.c. of ether, and, after rotating the flask once or twice, 5·2 c.c. of a solution of ammonia, prepared by mixing 17 Gm. of ammonia (sp. gr. 0·960) with 83 Gm. of water. The whole is then vigor-

ously shaken for 10 minutes, and the flask and contents are subsequently kept for 24 hours at a temperature of 12°C. After this, as much of the ether as is possible is poured off through a filter of 8 centimetres in diameter, 15 c.c. of fresh ether is run into the flask, the latter rotated briskly (but so as to avoid forming an emulsion), and the ether again poured off through the filter. The whole of the liquid is then poured through the filter, the greater part (roughly two-thirds) of the crystals, however, being retained in the flask. The flask and filter are then washed with three lots each of 5 c.c. of water saturated with ether, and delivered from a pipette. Of each 5 c.c., 3 c.c. should be used to rinse the flask, and 2 c.c. run directly on to the filter. The filter with its contents is removed from the funnel, folded, and gently but firmly pressed between sheets of filter-paper. The filter is then opened, and the greater part of the crystals returned to the flask. Filter and flask are then placed in an air oven at 55°C. until dry. It is then perfectly easy to transfer the small quantity of crystals still adhering to the filter to the flask. Subsequently the crystals are dissolved in 25 c.c. N/10 H_2SO_4, and the excess of acid titrated with N/10 alkali, using methyl orange as an indicator. It is preferable, prior to this titration, to dilute the liquid to roughly 50 c.c., and to fix the end-point by means of the droplet method. The percentage of morphine in the sample is then calculated as follows :—

Let x = number of c.c. N/10 acid employed, then $x \times 0{\cdot}7575 + 1/13\ (x \times 0{\cdot}7575)$ = per cent. morphine.

Morphine, Determination of, in Opium and Tincture of Opium. E. Dowzard. (*Pharm. Journ.* [4], **17**, 908.) *Opium.* Eight Gm. of the sample to be examined is placed into a dry 200 c.c. conical flask, with 100 c.c. of water, and the flask closed with an indiarubber stopper; it is then placed in water kept at about 80–90°C., shaking frequently, in the case of fine or coarse powder for about 1 hour, if in the raw state, until complete disintegration takes place. The flask is now cooled and 3 Gm. of slaked lime added, the rubber stopper is inserted, and the contents of the flask agitated frequently during the course of 1 to 2 hours. The mixture is then filtered through a plaited filter and 51·6 c.c. of the filtrate (equal to 4 Gm. of opium) is transferred to a stout 200 c.c. conical flask, fitted with a sound cork; to this is added 5 c.c. of 90 per cent. alcohol, 30 c.c. of ether, and 2 Gm. of ammonium chloride; the cork is inserted and the flask shaken for

30 minutes, either by hand or in a mechanical shaker. After standing for 12 hours, the flask is shaken for a few minutes, and the mixture filtered through a single filter paper. The ether should not be removed with a pipette from the flask, but the whole poured on the paper. The aqueous portion will run through, leaving the morphine attached to the filter, while the ether is left perfectly clear, and may be completely removed with a pipette. After the morphine has been transferred to the filter, the last traces may be removed from the sides of the flask with a rubber-tipped glass rod; in this part of the process morphinated water is freely used for rinsing out the flask. A small quantity of morphine is usually attached to the cork; this should, of course, be removed. The filter and its contents are washed with morphinated water until the filtrate is free from chlorine; then one washing is given with distilled water, using about 10 c.c.; the filter is allowed to drain and about 15 c.c. of ether poured over its edges. After standing for a few minutes the ether may be removed with a pipette. The filter and its contents are now allowed to stand for about half an hour exposed to the air, and then transferred to a thick-walled beaker, 20 c.c. of N/10 H_2SO_4 is added, and the paper rubbed to a pulp with a glass rod. The liquid may be gently heated to ensure complete solution of the morphine; after cooling, the liquid is titrated with N/10 NaOH, using methyl orange as indicator. Each c.c. of N/10 H_2SO_4 is equal to 0·0283 Gm. anhydrous morphine, 0·05 Gm. being added to the weight of morphine found as directed in the B.P. (equals average loss of morphine per 50 c.c.).

There is no necessity to dry the alkaloid, as in the B.P. method; direct titration gives better results.

In the B.P. method for determining the morphine in the tincture a serious mistake has been made. 80 c.c. of tincture and 3 Gm. of slaked lime are used, and the mixture made up to 85 c.c. This is a very grave blunder, as the volume should only be made up to 81·9 c.c. 3 Gm. of slaked lime displace 1·44 c.c. of water.

The correction for the extractive carried down by the slaked lime was determined as follows: A sample of tincture of opium containing 3·24 Gm. of extractive per 100 c.c. was used for the following experiment: 100 c.c. were evaporated to about 30 c.c., mixed with 3 Gm. of slaked lime, and then made up to 101·5 c.c. with water; after standing for 1 one hour the mixture was

filtered, and the extractive determined in the filtrate. This was found to be 2·37 Gm. per 100 c.c., 0·87 Gm. of extractive had been carried down by the lime. 3 Gm. of dry powdered opium extract was found to displace 1·9 c.c. of water. 0·87 Gm. would therefore displace 0·55 c.c. 80 c.c. of tincture would lose 0·736 Gm. of extractive, which is equal in volume to 0·466 c.c. of water; this, added to the volume occupied by the lime, is equal to 1·9 c.c. (1·44 + 0·466). Of course, the correction will vary for different samples, but 1·9 c.c. will not be far wrong. As a consequence of the above error, the B.P. tincture is about 4 per cent. stronger than it appears to be.

This is well illustrated by the following experiment: Some powdered opium, standardized to contain 10 per cent. of morphine, was made into tincture; when the tincture was tested by the B.P. method, the strength was considerably below what it should have been according to calculation. The amount of morphine in the opium marc was determined, and all losses allowed for: but still there was a considerable discrepancy, which was, however, completely accounted for by the above-mentioned fact.

The following method is free from the above and other objections: 100 c.c. of the tincture is evaporated in a porcelain dish on a water-bath until the volume is reduced to about 30 c.c., the residual liquid is cooled, and 3 Gm. of slaked lime added; the mixture is then worked into a smooth state with a small glass pestle, and transferred to a 100 c.c. measuring flask. Any traces of the matter left in the dish may be removed with a rubber-tipped glass rod. The mixture is then made up to 100 c.c. at the same temperature the tincture was measured at; if there is any froth it may be removed by adding 1 or 2 drops of ether; 2 c.c. of water is then added, and the mixture allowed to stand for 1 hour, agitating frequently. The mixture is filtered, and 50 c.c. of the filtrate (= 50 c.c. of tincture) operated on as described under opium.

Morphine, Determination of, in Opium and its Tincture, Correction for Increase of Volume in. E. Dowzard. (*Pharm. Journ.* [4], **18**, 397.) The author reiterates that the amount of filtrate directed to be collected in the official process as representing a given quantity of opium, to correct for the increased volume due to soluble extractive and lime, is excessive. A series of experiments lead him to the opinion that the correct amounts should be as follow:—

Opium. When 8 Gm. of opium, 3 Gm. of slaked lime, and 100 c.c. of water are used, 50·9 c.c. of the filtrate will be equal to 4 Gm. of opium.

Tincture. Working with 100 c.c. of tincture and 3 Gm. of slaked lime, it will be necessary to make the final volume up to 102 c.c., 50 c.c. of the filtrate from this mixture will be equal to 50 c.c. of the original tincture.

Mustard, Determination of Essential Oil in. — Vuillemin. (*Apoth. Zeit.*, **19,** 187.) Five Gm. of powdered mustard is mixed into a 200 c.c. flask with 100 c.c. of water at 25–30°C. The flask is well stoppered and agitated occasionally for an hour; 20 c.c. of alcohol is then added, and the flask fitted to a Liebig's condenser, the delivery tube of which dips into an Erlenmeyer flask containing solution of ammonia, 30 c.c., and alcohol, 10 c.c. To avoid the possibility of loss, this receiver is connected with a second flask, also containing ammonia and alcohol. Distillation is then continued until half the liquid has been collected. The distillate thus obtained is treated with 3 or 4 c.c. of 10 per cent. $AgNO_3$ solution, and warmed on the water-bath to aggregate the precipitated Ag_2S. This is then collected on a tared filter, washed first with water, then with alcohol, and lastly with ether. It is finally dried at 80°C. and weighed. The weight obtained $\times 8{\cdot}602$, gives the percentage of oil. According to the author, this varies from 0·815 to 1·19 per cent. in the seeds of *Brassica nigra.*

In the case of plasters, the article itself, or the powder scraped off it, is treated with tepid water. Maceration must be performed for at least $1\frac{1}{2}$ hours. If frothing be troublesome during the distillation, a larger flask may be used and more alcohol added during the process. The average yield of mustard oil from commercial plaster varies from 0·011 to 0·043 per cent.

Myrcia acris (Bay Leaf), Essential Oil of, from Bermuda. (*Schimmel's Report, May,* **1904,** 13.) A sample consignment of "bay leaves" from Bermuda was found to yield 1·33 per cent. of oil having characters widely divergent from those of the West Indian oil. The oil of the Bermuda leaves had the sp. gr. at 15°C. 1·0301; $[\alpha]_D - 3° 4'$; $[\eta]_{D20}$ 1.53012; phenols, 61 per cent.; solubility in alcohol 80 per cent., 1 : 0·4. The solubility of the oil and its high sp. gr. are noteworthy.

Nerol, Characters of. H. von Soden and W. Treff. (*Chem. Zeit.*, **27,** 897, through *Analyst*, **28,** 365.) When nerol

is thoroughly freed from geraniol it forms a colourless oil, and possesses a more agreeable rose-like odour than the product usually obtained from the oils of neroli or petitgrain. In the pure state, its sp. gr. at 15°C. is 0·8813. It is optically inactive. Under a pressure of 755 mm. it boils at 226–227°C.; at the reduced pressure of 25 mm. its b.p. is 125°C. Its formula is $C_{10}H_{18}O$, and it unites with exactly 4 atoms of bromine. The diphenylurethane of pure nerol crystallizes from alcohol in colourless glittering needles which melt at 52–53°C. Hesse and Zeitschel have given 73–75°C. as the m.p. of the diphenylurethane prepared from a nerol contaminated with geraniol; but this higher figure is simply due to the presence of geranyl diphenylurethane, which melts at 82°C.

Nickel and Cobalt, Distinctive Reaction for. G. Guerin. (*Journ. Pharm. Chim.* [6]. **19,** 139.) Solutions of cobalt precipitated by excess of KOH. then treated with sufficient solution of I in KI. 2 per cent., until the supernatant liquid is coloured yellow, throw down the whole of the Co as a black precipitate of hydrated sesquioxide. Ni salts give a green precipitate of hydrate. The same occurs with the precipitates of the two metals thrown down with alkaline ferrocyanides, carbonates, and phosphates, when treated as above. The ferricyanides of Ni and Co behave differently. Treated with excess of KOH the nickel precipitate is at once converted into hydrated sesquioxide, cobalt ferricyanide more slowly.

Nicotine, Determination of, in Tobacco Products. — Waldbott. (*Chem. Zeit.*, **1903,** 1255.) Ten c.c. of the tobacco solution is intimately mixed in an open vessel with 15–20 Gm. of $NaHCO_3$ so as to form a plastic or almost dry mass. This is then extracted by warming with $CHCl_3$ in successive portions of about 20 c.c. at a time until about 100 c.c. of $CHCl_3$ extract has been obtained. A known quantity of N/H_2SO_4 solution is then run in in excess, and the free acid titrated back in the usual manner with $N/\frac{1}{2}NaOH$. Copper sulphate solution is employed as the indicator, which gives with free nicotine a greenish precipitate, so that the end reaction is obtained as soon as the liquid under titration becomes cloudy. The error due to the presence of ammonia does not exceed 0·2 per cent. by this method in ordinary products, and, in those containing a large quantity of ammonium salts, does not exceed 0·4 per cent.

Nux vomica. St. Ignatius' Beans, Ipecacuanha, and Cinchona,

Alkaloidal Assay of. E. Léger. (*Journ. Pharm. Chim.* [6], **19,** 479.) *Nux Vomica: First Method.* The moisture having been determined at 100°C. in a small portion of the powdered drug, the equivalent of 12 Gm. is weighed off and placed in a stoppered, wide-mouth flask with a mixture of chloroform, 20 c.c., and ether, sp. gr. 0·721, 100 c.c. After 5 minutes' agitation 5 c.c. of a mixture of equal parts of solution of ammonia and water is added. The stopper is then tied down with a piece of linen and the whole allowed to macerate for 3 hours with occasional agitation. After settling, 80 c.c. of the liquid, equivalent to 8 Gm. of the original powder, is filtered off through a covered funnel; this filtrate is transferred to a separator and shaken out successively with 25, 15, and 10 c.c. of a mixture of hydrochloric acid, 2 c.c., and water, 48 c.c. These acid solutions, collected in a second separator, are rendered alkaline with ammonia and shaken out with 50 c.c. of the ether chloroform solvent. The aqueous layer is transferred to the first separator, previously emptied, and again shaken out with another 50 c.c. of the solvent. The two ether-chloroform solutions are bulked, washed by shaking out with 2 c.c. of water, and distilled, in two portions, from a small conical tared flask, the residue dried to constancy at 100°C. and weighed; the weight multiplied by 12·5 gives the percentage of total alkaloids in the dry drug; this should be about 2·5 per cent.

Second Method. Modified Prollius's fluid (solution of ammonia, 4 c.c., absolute alcohol, 16 c.c., ether, sp. gr. 0·721, 130 c.c.) may be substituted for the above ether-chloroform solvent. For the equivalent of 12 Gm. of the dry powder 190 c.c. of this is employed. After macerating for 12 hours, 150 c.c. of the liquid is filtered off, and distilled in two portions in a small flask, and finally dried by heating in the stove at 100°C., with the flask inclined, for 15 minutes, the last traces of solvent being removed by a current of air. The dry residue is treated with 12 c.c. of a mixture of hydrochloric acid, 21 c.c., in water, 14 c.c., the flask being closed with a rubber cork, warmed on the water-bath and well shaken. The bases are thus dissolved by the acid while the fatty matter, on cooling, adheres to the sides of the flask. When cold, the liquid is passed through a small filter, 10 c.c. of the filtrate taken and treated as described under cinchona, *Fourth Method*, below. The weight of alkaloids obtained multiplied by 12 gives the percentage.

St. Ignatius' Beans. The process followed is that given for

the first method for nux vomica. The yield of total alkaloids is generally higher than in the case of nux vomica, G. Sandor having found 3·1–3·2 per cent.

Ipecacuanha : First Method. Similar to the first method for nux vomica, but adding solution of ammonia, 2 c.c., and water, 8 c.c., to the first ether-chloroform maceration liquid, and macerating for 1 hour only ; 10 c.c. of water is then added to aggregate the powdered drug, and 100 c.c. of filtrate, corresponding to 10 Gm. of the original dry drug, is collected. The process is then continued precisely as directed for nux vomica. The weight of alkaloids multiplied by 10 gives the percentage, which should not be below 2 per cent.

Second Method. Precisely similar to the second method for nux vomica.

Cinchona : First Method. Similar to the second method for nux vomica, except that the assay is performed with the equivalent of 6 Gm. of dry bark, which is macerated for 12 hours with 150 c.c. of the Prollius's fluid ; 120 c.c. of filtrate is then collected, corresponding to 5 Gm. of bark. The process is completed as described below under Process 4. The weight of total alkaloids obtained multiplied by 24 gives the percentage.

Second Method. The equivalent of 6 Gm. of powder is macerated with 120 c.c. of chloroform and 5 c.c. of solution of ammonia for 4 hours ; 100 c.c. of filtrate, equivalent to 5 Gm. of dry bark, is then collected, and treated as described under Process 4.

Third Method. The same quantity of powdered bark is mixed with calcined magnesia, 2 Gm., and a mixture of caustic soda, 1 c.c., with water, 3 c.c. The moist powder is introduced into a flask, and, after standing for 2 hours, 150 c.c. of chloroform is added and the total weight taken, then the whole heated under a reflux condenser for 1 hour. The flask is again weighed and made up to its original weight by the addition of more chloroform. After mixing, 120 c.c. of filtrate is collected (equivalent to 5 Gm. of powdered dry bark), and treated as described under Process 4.

Fourth Method. This is practically Portes's modification of Prollius's method. A weight of powdered bark equivalent to 6 Gm. of dry material is introduced into a wide-mouth stoppered flask with 6 c.c. of solution of ammonia and 24 c.c. of alcohol 90 per cent. After macerating for 1 hour, with occasional agitation, 120 c.c. of ether, sp. gr. 0·721, is added, and the mixture thoroughly agitated ; the stopper being tied down, the

whole is macerated, with frequent agitation, for 6 hours ; 120 c.c. of filtrate is then collected from a covered funnel, corresponding to 4·8 Gm. of dry material. This is distilled off in several small portions in a small flask. The thoroughly dry residue is taken up in 12 c.c. of a mixture of hydrochloric acid, 1 c.c., and water, 14 c.c. Solution of the alkaloids is facilitated by the introduction of a few grains of retort-carbon or pumice stone. When solution is complete 10 c.c. of filtrate is collected through a small filter, and shaken out in a separator with 20 c.c. of chloroform and 4 c.c. of a mixture of equal volumes of solution of ammonia and water. The chloroformic alkaloidal solution is run out into another separator, and the aqueous layer again shaken out twice with two more 20 c.c. of chloroform. The bulked chloroformic extracts are washed by agitation with 2 c.c. of water, then filtered off and distilled, in small portions at a time, from a small tared flask. The residue is dried to constancy at 100°C. and weighed. The weight multiplied by 25 gives the percentage of total alkaloids. With the same rich succirubra bark the first process gave 7·44 per cent. ; the second, 7·96 per cent. ; the third, 7·40 per cent. ; and the fourth, 8·36 per cent. of total alkaloid. The last method is, therefore, to be preferred.

Oils of Certain Palms from French Guiana, Characters of. — Bassière. (*Moniteur Official du Commerce*, through *Journ. Pharm. Chim.* [6], **18** ; [7], 323-329.) *Maripa Fat.* This is probably the product of two, if not three, species of palms belonging to the genus *Attalea* ; *A. maripa*, *Mart* (*Palma maripa*, *Aubl.*) *A. excelsa*, *Mart.* (Maximiliana, Drudé,) and possibly also *A. spectabilis*. The white or yellowish butyraceous matter furnished by the fruit is much esteemed. Its chemical composition is unknown. The fat of the kernels, extracted by the same boiling method as pinot oil, is white and fragrant. It is employed in Guiana in a similar manner to coconut fat, and has a reputation as a liniment ; it is fluid at the normal temperature of the tropics, but has a butter-like consistence in temperate climates. The sample examined was slightly rancid ; its m.p. was 23°C. It had the following characters : Iodine value, 9·49 ; saponification value, 259·6 ; m.p. of fatty acids, separated by saponification, 25°C. ; these contain 11·5 per cent. of oleic acid, the rest being solid at normal temperatures. It is identical with coconut fat in all its properties, and would furnish an edible fat after purification with steam. It saponifies easily, forming a pasty soap which lathers well.

Comou Oil is furnished by at least two species of palms, *Œnocarpus bataua Mart and Œ. bacaba Mart.* The fruit of the former furnishes a pale bland oil, known as "Patava oil," which is used for lighting, for culinary purposes, and for adulterating olive oil. The kernels of the fruits, treated with boiling water as described under maripa oil, yield a pale yellow limpid oil, having the following characters: Acid value, 8·6; saponification value, 169·1; iodine value, 96·5; Hehner value, 95·7; acetyl value, 3·4; Reichert value, 1·2. The fatty acids have the molecular weight, 281·9; when separated by saponification they melt at 19°C. and contain 19 per cent. of oleic acid. The oil is but slightly siccative. It saponifies easily, giving a white soap which retains but little water.

Oils, Some New or Little Known. J. A. Wijs. (*Zeit. für Untersuch. der Nahr.* [11], **6**, after *Pharm. Zeit.* [54], **48**, 543.) *Echinops Oil*, the fat of the seeds of *Echinops ritro*, has the following characters: Sp. gr. at 20°C., 0·9275; free acid (as oleic acid), 4·38–7·31 per cent.; saponification value, 189·2–190; iodine value, 138·1–141·2; acetyl value, 26·5; saponification value, after acetylizing, 211·2. It is soluble in 15 parts of alcohol, and gives neither Halphen's nor Baudouin's reaction.

Perilla Oil, from the seeds of *Perilla ocymoides*, resembles linseed oil in odour, taste and in dark colour. It has the following constants: Sp. gr. at 20°C., 0·9306; free acid (as oleic acid), 0·48 per cent.; saponification value, 189·6; iodine value, 206·1. It responds to neither Halphen's nor Baudouin's reaction.

Water Melon Oil, from the seeds of *Cucumis citrullus*, obtained by extraction with benzine, is a bland, yellow oil with but little odour. It has the following constants: Sp. gr. at 20°C., 0·9160; free acid as oleic acid, 1·20 per cent.; saponification value, 189·7; iodine value, 118·0. It gives neither Halphen's nor Baudouin's reaction.

Tea Seed Oil, from Japan, has the sp. gr. 0·911 at 20°C. Free acid (as oleic acid), 8·07 per cent.; saponification value, 188·3; iodine value, 88·9. It is a yellow oil with an aromatic taste and odour.

Garden Cress Oil, extracted with benzine from the seeds of the plant which, thus treated, yield about 25 per cent., has the characteristic odour of the herb. Sp. gr. at 20°C., 0·9212–0·9221; free acid (as oleic acid), 0·51–0·56 per cent.; saponification value, 185·6–186·4; iodine value, 133·4–139·1.

Radish Oil, obtained from radish seeds by cold expression, is yellowish in colour, and resembles rape oil in taste and odour; it has the sp. gr. 0·9142; free acid (as oleic acid), 1·68 per cent.; saponification value, 179·4; iodine value, 112·4.

Fixed Oil of White Mustard Seeds, obtained by cold expression, has the sp. gr. 0·9121; free acid (as oleic acid), 1·27 per cent.; saponification value, 174·6; iodine value, 103·0.

Fixed Oil of Black Mustard Seeds, obtained by cold expression, has the sp. gr. 0·9143 at 20°C.; free acid (as oleic acid), 1·10 per cent.; saponification value, 175·8; iodine value, 122·3. Both black and white mustard seed are dark yellow in colour and devoid of characteristic odour or taste.

Olein and Esters, Biochemical Synthesis of. H. Pottevin. (*Comptes rend.*, **138**, 378.) The author has previously shown that glycerin and oleic acid combine, under the influence of the pancreatic ferment, to form mono-olein. It is now found that triolein, identical with natural triolein, may be obtained in a similar manner. Pig's pancreas is rendered fat-free by treatment with ether, and anhydrous by means of alcohol; if a solution of mono-olein, 1, in oleic acid, 15, be mixed with 1 per cent. of this prepared pancreas, and maintained at 36°C., the acidity of the mixture gradually diminishes day by day. When this no longer occurs, triolein may be isolated from the solution. By employing methylic, ethylic or iso-amylic alcohol instead of mono-olein, the corresponding oleic esters are obtained. Amylic alcohol esterifies most rapidly. Iso-amyl oleate thus obtained is a colourless neutral liquid which does not solidify at 0°C.; its sp. gr. is 0·897 at 15°C. Stearic acid esterifies well with iso-amyl alcohol under similar conditions; iso-amyl stearate is solid at normal temperatures, m.p. 21°C. It crystallizes from alcohol in small square tablets. Acetic, butyric and propionic acids are esterified if their proportion in the alcohol does not exceed a certain limit, but lactic and benzoic acid are not capable of forming esters under the influence of pancreatic ferment; in fact, their presence prevents its action with other acids. The action takes place solely in direct contact with the pancreatic tissue; on removing this it ceases. The esters thus formed are at once saponified by the tissue in the presence of water. If the pancreatic tissue be heated to 100°C. it becomes quite inert.

Olivile. — Koerner and — Vanzetti. (*Chem. Zeit.*,

1903, 220, through *Journ. Pharm. Chim.* [6], **18,** 364.) The authors find that the crystalline principle olivile, isolated by Pelletier from olive-tree gum, has the property of combining with many solvents, such as water, primary and secondary alcohols, with which it forms definite crystalline compounds. When these are heated in a current of dry CO_2 at 130°C. for several hours, anhydrous olivile is obtained as a colourless, transparent, very refringent body, which, after recrystallization from acetone, trimethyl-carbinol or benzyl alcohol, melts at 142·5°C. and has the formula $C_{20}H_{24}O_7$. It contains two methoxyl and two phenolic hydroxyl groups. When methylated and oxidized by permanganate, it gives a mixture of veratric, veratrylformic, and oxalic acids. Olivile is converted into iso-olivile by boiling with water or dilute acetic acid. Olivile is lævo-rotatory, iso-olivile dextro-rotatory.

Orange Flowers, "Extracted" Essential Oil of. (*Schimmel's Report. Oct.*, **1903,** 50.) The oil obtained by treating the (petroleum) extract of fresh orange flowers with alcohol, and distilling the alcoholic solution, has the sp. gr. 0·9293. It contained the large quantity of 15 per cent. of anthranilic acid ester; linalyl acetate; methyl anthranilic ester; benzaldehyde; lævo-linalol; a small quantity of a base having the odour of nicotine, boiling above 110°C. at 6 mm. pressure; phenyl-ethyl alcohol; geraniol; a nitrile, probably phenyl acetic nitrile; indol; a nitrogenous crystalline body sparingly soluble in ether, crystallizing in laminæ, melting at 158°C.; a ketone with a jasmin-like odour, probably jasmone; and a high-boiling sesquiterpene alcohol.

Orange Flower, American, Essential Oil of. J. C. Umney and C. T. Bennett. (*Pharm. Journ.* [4], **18,** 217.) The oil imported from Buenos Ayres has much resemblance to ordinary Paraguay petitgrain oil, but appears to have a more delicate odour; it also contains a higher percentage of free alcohols and a lower percentage of esters than a normal Paraguay oil.

By fractionation under reduced pressure, pinene, dipentene, furfural, geraniol, linalol, and geranyl acetate were identified. The odour of terpineol was evident in two fractions, but it could not be obtained in the crystalline state. Geraniol is present in greater quantity than linalol.

The oil is stated to compare favourably and economically

with French petitgrain, and to be well adapted for use in perfumery and soap.

The most noticeable feature in connexion with this oil was the absence of more than traces of methyl anthranilate. This ester does not exist in sufficient quantity to be separated by Erdmann's method, although fractions showing a blue fluorescence have been obtained. The general characters of this oil, shown in comparison with those of Chinese neroli oil, French neroli oil, and petitgrain oils, are set out in the subjoined table :—

—	South American Oil.	Paraguay Petitgrain Oil.	French Petitgrain Oil.	French Neroli Oil.	Chinese Neroli Oil.
Sp. Gr. . . .	0·887	0·891	0·885 to 0·900	0·870 to 0·880	0·850
Opt. rot. . .	+2°	+0° 30′	—2° about	+1° to +35°	+35°
Esters as Linalyl Acetate . .	36·5 p.c.	52·4 p.c.	50 to 75 p.c.	10 to 20 p.c.	4·79 p.c.
Free Alcohols as Geraniol . .	38·4 p.c.	18·9 p.c.	25 to 35 p.c.	20 to 25 p.c.	21·4 p.c.
Total Alcohols.	67·1 p.c.	60·0 p.c.	—	—	25·17 p.c.

It will be seen from these figures that this South American oil contains at least 75 per cent. of odoriferous constituents, a very low percentage of terpenes being present. This is also shown by fractionation under atmospheric pressure, which gave the following results :—

Below 190°	5	per cent.
Below 195°	12	,, ,,
Below 200°	25	,, ,,
Below 205°	35	,, ,,
Below 210°	54	,, ,,
Below 215°	65	,, ,,
Below 220°	80	,, ,,
Above 220°	20	,, ,,

It is, therefore, readily soluble, even in 70 per cent. alcohol (two volumes).

Orange Flowers, Spanish, Essential Oil of. (*Schimmel's Report, Oct.*, **1903,** 77.) *Spanish neroli bigarade*, from bitter orange flowers, had the following characters : Sp. gr., 0·871 ; $[\alpha]$ +10° 54′ ; acid number, 1·37 ; ester number, 37·67. It contained 0·5 per cent. of methyl anthranilate. It is soluble in 1·5 vols. of alcohol 80 per cent., and more ; the dilute solutions

are fluorescent and become cloudy by separation of paraffin. The odour is similar, but markedly inferior, to French neroli oil.

Spanish neroli Portugal, from sweet orange flowers. Sp. gr., 0·8571 ; $[\alpha]_D + 42° 47'$; acid number, 1·6 ; ester number, 6·86. It is not soluble in alcohol 80 per cent., but dissolves in 90 per cent. spirit. It contains 0·3 per cent. of methyl anthranilate. According to Theulier, French neroli Portugal oil does not contain this ester.

Parsley Oil, French, Presence of Myristicin in. H. Thoms. (*Berichte*, **36**, 3451.) The fact that German parsley oil readily separates apiol when exposed to a low temperature, while French parsley oil does not, is due to the fact that the latter contains much myristicin,

$$C_6H_2.C_3H_5(1) : O_2CH_2(3.4)OCH_3(5),$$

and but little apiol,

$$C_6H_2.C_3H_5(1).OCH_3(2).O_2CH_2(3.4.)OCH_3(5),$$

while in the German oil apiol predominates.

Patchouli, Essential Oil of ; New Adulterant in. W. H. Simmons. (*Chem. and Drugg.*, **64**, 815.) The usual adulterants, cedarwood and cubeb oils, seem to have been supplemented or replaced by an ester or ester-containing oil, and the results obtained with two oils recently submitted for analysis may serve to warn purchasers of patchouli oil, and so prevent such adulterations becoming widespread. The analyses of two specimens of the oil gave the following figures :—

	A	B
Sp. gr. $\frac{15°C.}{15°C.}$	0·9948	0·9937
Rotation, $[\alpha]_D$	$-38° 30'$	$-49° 30'$
Refractive index at 20C.	1·5175	1·5110
Acidity	trace	trace
Saponification number	58	18·5
Solubility in 90 per cent. alcohol	1 in 0·75	1 in 0·3

It will be seen that in both cases the sp. gr. is slightly high, but not abnormal, the rotation of A distinctly low, and the refractive index of both somewhat high (the figures for patchouli oil ranging from 1·5064 to 1·5101). The most noteworthy figure in each, however, is the high saponification number. After

boiling with potash, the unsaponified oil was separated, the rest acidified and distilled, when with A a very distinct quantity of benzoic acid was obtained, together with a small amount of volatile fatty acid, while B gave some volatile fatty acid, but no benzoic acid. In the case of A an attempt was also made to separate any alcohol liberated during saponification by distillation *in vacuo*, but the quantity at disposal was too small to allow of its identification, though a somewhat camphoraceous odour was noticeable. This might be due to borneol, but since patchouli oil itself contains patchouli-camphor or alcohol, nothing definite can be said on that point.

Sample A is evidently adulterated, but the presence of a small amount of saponifiable matter in B may be the result of a defective process of distillation or the use of leaves admixed with foreign matter.

These results show the necessity, when examining patchouli oil, for taking the saponification number in addition to the usual physical constants of the oil.

Patchouli Leaves, Constituents of the Essential Oil of. (*Schimmel's Report, May,* **1904,** 68.) About 97 per cent. of patchouli oil consists of bodies having little or no odour value. Of this, 40–45 per cent. consists of sesquiterpenes, and the rest is probably patchouli alcohol. Direct fractionation having proved of little value, solution in alcohol 70 per cent. was employed to isolate the more important odorous principles. The alcohol was removed by distillation *in vacuo*, and the fractionation of the residual oil also performed under reduced pressure. By this means the following constituents were isolated: benzaldehyde, eugenol, cinnamic aldehyde; a terpene alcohol having a rose-like odour present in too small quantity for identification; a ketone with caraway odour forming a semicarbazone with the m.p. 134–135°C.; another body, m.p. 246–247°C., and crystallizing only from water, is also formed, which may prove to be the hydrazo-dicarbonamide, $NH_2CONH.NH.CONH_2$, of Thiele; a basic substance with a narcotic odour, obtained by shaking out with H_2SO_4, and liberating with NaOH.

By fractionation *in vacuo* this appears to be separable into two bases, one boiling between 80–130°C., and the other between 135–140°C. (3–4 mm. pressure).

The first forms a greasy hydrochloride with an indistinct melting-point, but a well-defined crystalline platinum salt, m.p. 208°C,

The second fraction had the $[a]_D$ −9° 5′, and the sp. gr. 1·0148. Its platinum salt has not yet been obtained pure. Cadinene could not be detected among the sesquiterpenes. The sp. gr. of these, distilled over sodium, varied from 0·9217 to 0·9379, and the $[a]_D$ from −27° 37′ to −40° 35′. Patchouli alcohol represents the bulk of the oil, and is found in the fractions boiling above 140°C. (under 8 mm. pressure). After repeated crystallization from petroleum ether it melts at 56°C. When quite pure, it is probably odourless. Patchoulene formed by dehydrating this alcohol with formic acid is a colourless liquid with a cedar-like odour; b.p. 255–256°C.; sp. gr. 0·9334; $[a]_D$ −36° 52′.

Peppermint Oil, Adulterated with African Copaiba Oil. E. J. Parry and C. T. Bennett. (*Chem. and Drugg.*, **63,** 154.) Specimens of adulterated peppermint oil have been examined which were not soluble in 70 per cent. alcohol, and contain a fraction of high boiling point, a sp. gr. within the limits of peppermint oil, but with a strongly positive optical rotation and a high refractive index. From the characters and chemical behaviour of the high boiling fraction it is evidently a sesquiterpene, and agrees in its properties with the oil of African copaiba balsam. From these physical characters and from its chemical reactions it is obvious that this body is a substance belonging to the sesquiterpene series which is not normally present in pure peppermint oil. It strongly resembles dextro-cadinene, which has been detected in small quantities by Power and Kleber in normal peppermint oils, but the proportion in which it exists in these oils is sufficiently large to show that it has been added for sophisticating purposes. The general characters of these adulterated oils were in close agreement, falling within the following limits:—

Sp. gr. at 15°C.	0·909 to 0·912
Optical rotation	−3° to +3° 30′
Refractive index	1·4760 to 1·4820
Esters as menthyl acetate	5·8 per cent. (average)
Total menthol	34·0 per cent. (average)

When shaken with 70 per cent. alcohol, oily drops separated and sank. The oils were soluble in absolute alcohol, and in 90 per cent. alcohol with opalescence. A preliminary examination of a typical sample gave the following results:—

FRACTIONATION UNDER ATMOSPHERIC PRESSURE.

Below 200°C.	nil.
„ 210°	12 per cent.
„ 220°	35 „
„ 230°	50 „
„ 240°	60 „
„ 250°	71 „
„ 260°	83 „
Above 260°	17 „

FRACTIONATION UNDER REDUCED PRESSURE (20 mm.).

Characters of Fractions Collected in 10 *per cent. Portions.*

No.	Sp. gr.	Rotation.	Ref. Index.
1	0·892	Nil	1·4672
2	0·899	− 3°	1·4657
3	0·905	− 8°	1·4666
4	0·908	−10°	1·4668
5	0·910	−13°	1·4687
6	0·910	−13°	1·4712
7	0·911	−12°	1·4748
8	0·914	− 2°	1·4820
9	0·918	+25°	1·4989
Residue	0·930	+45°	1·5095

Peppermint Oil, American, Adulterated. E. J. Parry and C. T. Bennett. (*Chem. and Drugg.*, **64**, 854.) Three samples of the adulterated oil had the following characters:—

	A	B	C
Sp. gr. at 15°C.	0·9086	0·9080	0·9080
Optical rotation (100 mm.)	−24°	−25°	−24°
Refractive index at 20°C.	1·4670	1·4670	1·4673
Total menthol	48%	48%	49·1%

The close agreement of these figures suggests that the oils emanated from a single source originally. The oils were insoluble in 70 per cent. alcohol, as much as 30–50 per cent. floating on the surface, according to the quantity of alcohol used. Two of the samples were fractionally distilled, and the following results were obtained:—

A

—	Per cent.	Sp. gr.	Rotation.	Ref. Index.
1	25	0·898	− 7° 40′	1·4628
2	25	0·9018	−20°	1·4629
3	25	0·9085	−29° 30′	1·4640
4	10	0·9110	−40°	1·4668
5	10	0·9186	−43°	1·4775
Residue . . .	5	—	—	1·4850

C

—	Per cent.	Sp. Gr.	Rotation.	Ref. Index.
1	25	0·895	− 8°	1·4640
2	25	0·903	−18°	1·4626
3	25	0·907	−30°	1·4631
4	5	0·910	−37°	1·4657
5	5	0·910	−39°	1·4675
6	5	0·913	−40°	1·4701
7	5	0·921	−44°	1·4802
Residue . .	5	—	—	—

In the distillation of C, a large quantity of the oil was used, and it was possible to refractionate fraction No. 7. This was separated into five fractions, each representing 1 per cent. of the original oil. These had the following characters :—

—	Sp gr.	Rotation.	Refractive Index.
1	0·914	−42°	1·4703
2	0·914	−42°	1·4703
3	0·917	−45°	1·4750
4	0·925	−43°	1·4860
5	0·933	−40°	1·5000

The later fractions of these various distillates were much less soluble than the corresponding distillates from pure peppermint oil, and in some a distinct taste of cedar wood oil was discernible.

The whole of these results point clearly to the adulterant being of the nature of a sesquiterpene, and are in agreement with the probable presence of cedarwood oil.

Genuine Wayne County peppermint oil gave fractions having the following optical properties:—

—	Per cent.	Rotation.	Refractive Index.
1	10	−11° 30′	1·4648
2	10	−11°	1·4648
3	10	−15° 20′	1·4645
4	10	−19°	1·4652
5	10	−21°	1·4634
6	10	−22°	1·4648
7	10	−24°	1·4660
8	10	−27° 30′	1·4680
9	10	−36°	1·4674
Residue	10	—	1·4768

Peppers, Commercial. J. W. Gladhill. (*Amer. Journ. Pharm.*, **76,** 71.) The author has determined the ash, ether extract, piperine and oleo-resin yielded by the various commercial peppers. The ether extract was obtained by percolating 10 Gm. of the finely powdered pepper with ether, in a small cylinder, evaporating the solvent spontaneously in a tared beaker, removing the last traces of solvent in a current of air and weighing. Piperine was determined by extracting, by percolation, 10 Gm. of the pepper with alcohol 95 per cent.; the percolate was then evaporated, treated with 100 c.c. of 10 per cent. KOH solution to dissolve out resins, the alkaline liquid being left in contact with the extract for 24 hours, with frequent agitation. The insoluble residue was then filtered out, washed free from alkali, dried, dissolved in alcohol 95 per cent., and filtered into a tared capsule; on evaporating the solvent the piperine was weighed. The oleo-resin was taken as the difference between the piperine and the ether extract results.

From the results obtained it is concluded that black pepper should not give more than 6·5 per cent. of ash, and white pepper 3 per cent. The ether extract for black pepper should be 7·5–10 per cent.; and for white pepper 6–9 per cent. Piperine should range from 5·5 to 9 per cent. in black pepper. The results obtained are given in the following table:—

Black Pepper.	Ash.				Ether Extract.				Piperine.				Oleo-resin.			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Singapore .	3·5	3·7	4·2	4·5	9·76	8·76	9·52	9·60	7·13	7·68	6·58	7·33	2·63	1·08	2·94	2·27
Tellicherry .	4·7	4·8	3·8	4·5	8·34	8·85	7·26	7·62	5·91	6·02	6·56	6·82	2·43	2·83	0·70	0·80
Aleppy . .	4·7	4·7			9·65	9·47			7·70	6·75			1·95	2·72		
Trang . .	3·9	3·8			8·44	8·83			5·12	5·61			3·32	3·22		
Lienburg .	3·8	4·0	3·6	4·0	8·70	9·48	8·83	8·78	6·50	6·28	5·98	6·31	2·20	3·20	2·85	2·47
Lampong .	5·0	5·5	5·4	5·2	8·92	10·31	8·76	9·58	7·76	8·30	7·00	7·28	1·16	2·01	1·76	2·30
W. C. Sumatra	4·3	4·0			9·28	9·22			7·00	6·68			2·28	2·54		
Acheen A .	4·3	4·5	4·0	4·7	10·06	10·10	9·80	9·20	7·56	7·96	7·67	7·10	2·50	2·14	2·13	2·10
,, C .	5·5	5·2			10·46	10·46			10·02	9·94			0·44	0·52		
White Pepper.																
Coriander .	1·0	0·8	1·0	0·8	8·27	11·68	8·16	7·90	6·81	9·00	7·16	6·84	1·46	2·68	1·00	1·06
Singapore .	1·1	1·0	1·2		8·78	8·45	8·20		7·26	6·78	7·20		1·52	1·67	1·00	
Penang . .	2·1	2·8	2·6		7·04	7·20	6·80		5·74	6·76	5·83		1·30	0·44	0·97	
Decorticated	1·9	0·8	1·2		7·64	6·60	7·26		6·25	6·30	7·02		1·39	0·30	0·24	

	Ash.								Ether Extracts.							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Hull . . .	9·4	9·6	8·9	7·0	7·7	8·3	8·3	8·8	6·39	6·39	8·88	8·93	5·36	5·46	5·00	5·92

Pepper hulls contained no piperine.

Pepsin, The Digestive Value of. M. Dechan. (*Pharm. Journ.* [4], **17**, 379.) To determine the amount of peptone produced by a given sample of pepsin, the following method is advocated: The pepsin solution is prepared so that each 125 c.c. contains 0·2 per cent. HCl and 0·005 Gm. pepsin. The egg albumin is prepared in accordance with the B.P. and the percentage of albumin, moisture, and ash determined. 12·5 Gm. of the coagulated and granulated egg albumin is placed in an 8 oz. bottle, 125 c.c. of 0·2 per cent. HCl added, together with 0·005 Gm. of the pepsin. This is kept in the incubator for 6 hours at a temperature of 40·5°C., the contents of the bottle being briskly shaken every half hour.

The bottle is now placed in the water-bath, the water of which is kept boiling, and allowed to remain there for half an hour, then set aside until next morning. The clear liquid is decanted, and the undissolved residue poured on to a tared filter, dried at 100°C., and calculated to original egg albumin. The filtrate is now very carefully and very nearly neutralized by means of normal potassium hydroxide solution, for the purpose of rendering the acid albumin or syntonin insoluble. This is allowed a few hours to settle, decanted, filtered, dried, weighed and calculated into moist albumin, as in the case of the undigested albumin. The nearly neutral filtrate is now saturated with zinc sulphate and set aside for 2 hours, again decanted, and the insoluble sediment poured on to an untared filter, washed three times with a saturated solution of zinc sulphate and allowed to air dry. The filtrate is now fully saturated with bromine water and, after 1 hour, poured on to an untared filter and air dried, as in the previous case. By this means an approximate, if not perfect, separation of undissolved albumin, acid albumin, albuminoses, and peptones have been affected. The filter containing the precipitated albuminose and peptone are treated by Kjeldahl's method for the determination of the nitrogen, and this calculated into albumin by using the factor 6·25. The error due to the filter and zinc sulphate is allowed for by a blank experiment with these materials. The following tabular statement shows the results obtained with samples of commercial pepsin:—

—	1	2	3	4	5	6	7	8	9
Undissolved Albumin	45·0	22·5	20·7	57·5	58·5	50·5	3·2	3·2	3·1
Acid Albumin	35·4	58·0	49·3	26·0	26·1	30·0	56·6	53·5	57·8
Albuminoses	9·1	14·8	11·5	5·6	7·0	8·5	14·8	13·7	14·5
Peptones	9·2	13·6	16·8	9·6	7·0	9·6	23·9	28·5	23·1
	98·7	98·9	98·3	98·7	98·0	98·6	98·5	98·9	98·5

It is not necessary to actually determine the percentage of peptones, as this can be ascertained by difference.

Persulphates, Alkaline, Volumetric Determination of. C. Marie and L. J. Brunel. (*Bull. Soc. Chim.*, **29,** 930, through *Analyst*, 27, 371.) The following volumetric method is recommended for the analysis of alkaline persulphates: From 0·3 to 0·4 Gm. of the sample is dissolved in 100 c.c. of water, and the solution neutralized (with methyl orange as indicator), heated with 2 c.c. of methyl alcohol, first for 5 minutes at 70–80°C., and then boiled for 10 minutes. It is then cooled and titrated with N/10 sodium hydroxide solution with methyl orange as indicator. One c.c. of the standard alkali is equivalent to 0·0135 Gm. of potassium persulphate, 0·0119 Gm. of sodium persulphate, and 0·0114 Gm. of ammonium persulphate. Taruggi's method of boiling a solution of ammonium persulphate with sufficient standard sodium hydroxide to completely replace the ammonium is shown to yield too high results, which is not the case when methyl alcohol is also present.

Petroleum Ether (Benzin U.S.P.) E. H. Gane. (*Proc. Amer. Pharm. Assoc.*, **51,** 260.) The requirements of the U.S.P. that petroleum benzin or petroleum ether should boil between 50° and 60°C., and have the sp. gr. 0·670–0·675, are not met by commercial specimens, and are not to be attained, according to the author, since these light petroleum fractions, when refractionated, undergo "cracking" which profoundly modifies the original boiling points. Thus a specimen labelled "Petroleum Ether," b.p. 60–65°C., commenced to boil at 35°C.; 75 per cent. distilled below 60°C., and the residue of 10 per cent. between 80° and 110°C. Different methods of distilling gave somewhat

different results, but, with all, the range of the boiling points was over 70°C.

Phaseolunatin, the Cyanogenetic Glucoside of Phaseolus lunatus. W. R. Dunstan and F. H. Henry. (*Chem. News*, **88,** 15.) In a communication to the Royal Society, the authors describe the cyanogenetic glucoside phaseolunatin, $C_{10}H_{17}O_6N$, which they have isolated from the seeds of *Phaseolus lunatus*, collected in Mauritius. It crystallizes in colourless needles, soluble in water. When hydrolized by emulsin, or by boiling with dilute acids, it splits up into dextrose, acetone, and hydrocyanic acid, thus :—

$$C_{10}H_{17}O_6N + H_2O = C_6H_{12}O_6 + (CH_3)_2CO + HCN.$$

When warmed with alkalies, it combines with 2 molecules of water, forming phaseolunatinic acid and ammonia,

$$C_{10}H_{17}O_6H + 2H_2O = C_{10}H_{18}O_8 + NH_3,$$

and this acid is converted, by dilute acids, into dextrose and *a*-hydroxy-isobutyric acid,

$$C_{10}H_{18}O_8 + H_2O = C_6H_{12}O_6 + C_3H_5.OH.COOH.$$

Phaseolunatin is therefore a dextrose ether of acetone-cyanhydrin, and its constitution may be represented by the formula $(CH_3)_2C(CN)-O-C_6H_{11}O_5$. It therefore differs from amydalin, dhurrin and lotusin, the other known cyanogetic glycosides, since it contains an aliphatic nucleus, whereas the others are aromatic compounds. Under cultivation, a white variety of *Phaseolus lunatus* is obtained, which contains no phaseolunatin, and therefore yields no prussic acid. In this the bean shows an analogy to the well-known sweet and bitter varieties of the almond. The amount of hydrocyanic acid obtained from the active beans was found to vary between 0·041 per cent. in light brown beans to 0·088 per cent. in a dark brown variety.

Phosphorus, Free, Quantitative Determination of. — Katz. (*Gesellschaft Deutsch. Naturforscher u. Aertz. ; Kassel, Sept.*, **1903**; *Chem. Zeit.* [78], **27,** 957.) Ten Gm. of phosphorized oil, or a corresponding quantity of any solution, not containing more than 0·1 Gm. of free phosphorus, is thoroughly agitated, in a separator, with a 5 per cent. solution of copper nitrate, until a black permanent emulsion results, and all vapour of phosphorus has disappeared. Fifty c.c. of ether is then shaken up

with the mixture, followed by 10 c.c. of hydrogen peroxide, or sufficient to entirely discharge the black colour at first formed. After separation, the aqueous layer is run off, the ethereal liquid washed by shaking out with three successive washings of 10 to 20 c.c. of water; the bulked aqueous extracts, after the addition of a few drops of hydrochloric acid, are then evaporated to 20 c.c., filtered and treated with sufficient ammonia to redissolve the precipitate at first formed. The phosphoric acid is then determined in the solution in the usual manner by means of magnesium mixture. Copper nitrate is used instead of copper sulphate in the process, to avoid the precipitation of basic magnesium sulphate on addition of the magnesium mixture.

Phytin. S. Posternak. (*Journ. Pharm. Chim.* [6], **18,** 543.) According to the author all plants contain, in those parts destined for the support of the vegetable embryo, a distinct organic phosphorus compound, which has been named phytin; it is an anhydro-oxymethylene-diphosphoric acid, and has the formula $C_2H_8P_2O_9$.

Picric Acid, Solubility of, in Ether. J. Bougault. (*Journ. Pharm. Chim.* [6], **18,** 116.) The statement in text-books that picric acid is more soluble in ether than in water is incorrect. In water this solubility is approximately 12 : 1,000. In dry ether it is 10·8 : 1,000 at 13°C. The ethereal solution, moreover, has the curious property of being quite colourless, but the addition of a trace of moisture imparts to it the characteristic deep yellow colour. The solubility of the acid is found to vary with the degree of hydration of the ether; that having the sp. gr. 0·725, and containing 0·8 per cent. of H_2O dissolves 36·8 : 1,000; at the sp. gr. 0·726, containing 1 per cent. of H_2O 40 : 1,000. Since the shades of colour between the solution of the acid in anhydrous ether, and the deep yellow of that in ether sp. gr. 0·725 is very marked, it follows that treatment with dry picric acid forms a ready test for determining if a specimen of ether be anhydrous, and, approximately, the amount of water, if any, present.

Pilocarpine, Colour Reactions for. E. Barral. (*Journ. Pharm. Chim.* [6], **19,** 188.) A dilute solution of pilocarpine gives, when warmed with sodium persulphate, an unpleasant ammoniacal odour; the vapours turn red litmus paper blue, and blacken mercuric nitrate paper.

A mixture of formalin and sulphuric acid, when heated with a few drops of pilocarpine solution, gives at first a yellow colour, then yellowish-brown, blood-red, and finally red-brown.

Mandelin's reagent gives a golden-yellow colour when warmed with very dilute pilocarpine solution; this gradually changes to bright green, and ultimately to a permanent bright blue, the last colour persisting on dilution. Potassium permanganate in 1 per cent. solution in concentrated H_2SO_4 is at first decolorized on warming with pilocarpine solutions, then becomes deep yellow and gives off white fumes which have an odour similar to that of burning tartaric acid.

Pilocarpine, Constitution of. H. A. D. Jowett. (*Journ. Chem. Soc.*, **83**, 438.) It has been previously shown by the author that when iso-pilocarpine is oxidized with potassium permanganate, homopilopic acid is produced, the constitution of which has been determined.

The constitution of the residual portion of the molecule of iso-pilocarpine has been determined by a study of the reactions of dimethylglyoxaline and dimethylpyrazole, and by the formation of 1-methylglyoxaline, 1 : 4 (or 1 : 5) -dimethylglyoxaline, 1 : 4 (or 1 : 5) -methylamylglyoxaline, together with ammonia and methylamine, when the alkaloid is distilled with soda-lime.

Dimethylglyoxaline, from iso-pilocarpine, boiled at 210–215°C., and formed crystalline salts; platinichloride, m.p., 238–239°C.; aurichloride, m.p., 214–215°C.; picrate, m.p. 167°C. It is isomeric and not identical with the dimethylglyoxaline described in a subsequent note by the author. On oxidation, it yields ammonia, methylamine, and acetic acid.

Methylamylglyoxaline, from iso-pilocarpine, boiled at 158–160°C. under 10 mm. pressure; platinichloride, m.p. 198°C.; picrate, m.p. 134°C.; aurichloride, amorphous. On oxidation, this base yielded ammonia, methylamine and n-hexoic acid.

Methylamyleneglyoxaline, which probably exists in the fraction boiling at 145–160°C. under 10 mm. pressure, was not isolated; its presence was inferred from the formation of butyric acid during oxidation.

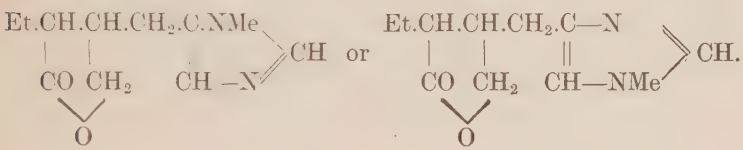
Iso-pilocarpinolactone, on oxidation with permanganate, yielded ammonia, methylamine, and pilopic acid, whilst pilocarpine gave rise to ammonia, methylamine and homopilopic acid.

Iso-pilocarpine, which could not be reduced electrolytically, did not form diacidic salts, and on titration behaved as a normal lactone.

Iso-pilocarpine methiodide with picric acid, yielded the compound previously described as methylisopilocarpine picrate, but which should be termed iso-pilocarpine methyl picrate.

The absorption spectra of pilocarpine and iso-pilocarpine, kindly determined by Prof. J. J. Dobbie, were absolutely identical.

The following formulæ are proposed for pilocarpine and iso-pilocarpine :—



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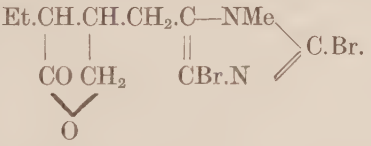
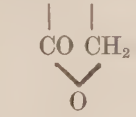
and it is suggested that pilocarpine and isopilocarpine are stereoisomerides, the asymmetric carbon atom involved being that contiguous to the carboxyl residue.

The following configurations are proposed on the basis of formula 1 :—

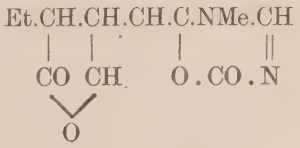
Dibromopilocarpine or dibromoisopilocarpine—



Dibromoisopilocarpinic acid—



Isopilocarpinolactone—



Bromocarpinic acid—

$CO_2H.CHEt.CH_2.CH : CH.NMe.CBr.N.CO_2H.$

It was shown that the explanation given by Pinner and Schwarz of the formation of pilocarpoic acid, $C_{11}H_{16}O_5N_2$, is quite untenable, but no suggestions as to the constitution of this substance or pilomalic acid are offered.

Pilocarpine, Constitution of. H. A. D. Jowett. (*Proc. Chem. Soc.*, **19**, 41.) The acid formed by the fusion of isopilocarpine with caustic potash, and at first regarded by the author as isobutyric acid, is now found to be normal butyric acid, similar to that obtained by the fusion of pilopic acid with that alkali (*Year-Book*, **1903**, 123), thus confirming the presence of the normal butyric acid group in pilocarpine. (See also *Year-Book*, **1901**, 100.)

Pimento, Constituents of the Essential Oil of. (*Schimmel's Report, May*, **1904**, 75.) The following constituents, in addition to those already known, eugenol and a sesquiterpene, have been detected in pimento oil: Cineol, lævo-phellandrene, caryophyllene, methyl eugenol and palmitic acid, with probably a small trace of terpene alcohols.

Pinus laricio (Austrian) Turpentine, Constituents of. A. Tschirch and G. Schmidt. (*Archiv der Pharm.*, **241**, 570.) Austrian turpentine contains two free acids, one amorphous, *laricopininic acid*, $C_{21}H_{20}O_3$, removed by shaking out the ethereal solution of the turpentine with 1 per cent. ammonium carbonate solution; the other crystalline, *laricopinonic acid*, $C_{20}H_{28}O_4$, dissolved out by means of 1 per cent. sodium carbonate solution; an *essential oil*, boiling between 154–164°C., having the sp. gr. 0·872, and occurring to the extent of 32 per cent.; indifferent *resene*; with traces of bitter principle and impurities.

Pistacia lentiscus, Constituents of the Resin of. A. Tschirch and L. Reutter. (*Archiv der Pharm.*, **242**, 104.) By shaking out an ethereal solution of mastich with 1 per cent. ammonium carbonate solution, two resin acids were removed, equal together to 4 per cent. of the original drug. These were isomers, having the common formula $C_{23}H_{36}O_4$; one, *α-masticinic acid*, was precipitated by lead acetate; the other, *β-masticinic acid*, not so precipitated. Subsequent shaking out the original ethereal solution with 1 per cent. soda yielded: crystalline *masticolic acid*, $C_{23}H_{36}O_4$, 0·5 per cent.; amorphous *α-masticonic* acid, $C_{32}H_{48}O_4$, 20 per cent.; both precipitated by lead acetate; and

β-masticonic acid, $C_{32}H_{48}O_4$, not precipitated by lead acetate, 18 per cent. The portion insoluble in these alkalies consisted of two resenes, *α-masticoresene*, $C_{35}H_{56}O_4$, 30 per cent. soluble in alcohol; and *β-masticoresene*, 20 per cent. insoluble in alcohol. The essential oil amounted to 2 per cent.; it had a camphoraceous odour. *α*-Masticinic acids melt at 90–91°C.; *β*-masticinic acid at 89·5–90°C; masticolic acid at 201°C.; *α*-masticonic acid at 96–96·5°C.; *β*-masticonic acid at 91–92°C.; and the *α*-masticoresene at 74–75°C. Of the two constituents masticic acid and masticin, recorded many years ago by Johnston, masticic acid is shown to be a mixture of the five acids above named and *α*-masticoresene, while masticin is impure *β*-masticoresene.

Pomegranate Bark, Determination of Total Alkaloids in. E. Léger. (*Journ. Pharm. Chim.* [6], **19,** 329.) Twenty Gm. of the bark is powdered and passed through a fine sieve. The moisture is determined in 0·5 Gm. of the powder. A quantity equivalent to 15 Gm. of dry powder is intimately mixed, in a mortar, with MgO, 5 Gm., and 10 c.c. of distilled water. The mixture is placed in a 500 c.c. flask, corked up and set aside for 2 hours; 150 c.c. of $CHCl_3$ is then added, and the weight of the flask and its contents noted. The flask is then fitted to a reflux condenser and boiled for an hour. After cooling, the original weight is adjusted by the addition of more $CHCl_3$, and, after mixing, the whole is thrown on a filter, the filtrate being collected in a graduated 100 c.c. flask, the funnel being covered with a glass plate during filtration. The 100 c.c. of filtrate thus collected, equivalent to 10 Gm. of the dried bark, is distilled in two portions from a 125 c.c. flask until 80 c.c. of distillate have been collected. The residual concentrated $CHCl_3$ extract is transferred to a separator, the distillation flask washed out with 40 c.c. of neutral ether, employed in two portions, and added to the $CHCl_3$ extract. To this ether-chloroform solution 10 c.c. of N/10 HCl is added, and the whole shaken out after adding about 20 c.c. of H_2O. The acid aqueous extract is run out into a glass-stoppered 250 c.c. flask, and the ether chloroform extract again shaken out with two successive 30 c.c. of H_2O, these washings being added to the first separated acid liquid in the flask. Sufficient neutral ether is then added to the acid aqueous extract to form a layer about 1 Cm. deep. Five drops of 0·2 per cent. alcoholic solution of iodeosin are then

added, and the amount of free acid titrated back with N/10 KOH solution until, after vigorous shaking, the aqueous layer shows a pale rose tint. The number of c.c. thus used, subtracted from 10, the number of c.c. of N/10 HCl first added, gives the amount of that acid used up by the alkaloids of the bark. The number of c.c. thus combined × 0·1475 gives the percentage of total alkaloids. This should not be less than 0·25 per cent. To obtain the neutral ether necessary for the determination, ether sp. gr. 0·721 is shaken out with water containing a little N/10 KOH, which is then neutralized with N/10 HCl, using iodeosin as the indicator. The standard solutions, too, should be set by titration against each other with the same indicator.

Pongamia glabra, Fixed Oil of. J. Lewkowitsch. (*Analyst*, **27**, 342.) The author has compared the oil, extracted by himself by means of ether, with the native expressed oil which is employed in India as an illuminant, and for medicinal purposes :—

	Extracted in the Laboratory with Ether.	Specimen obtained from India.
Sp. gr. at 40°C. (water at 40°C. = 1)	0·9352	0·9240
Sp. gr. at 15°C. (water at 15°C. = 1)	—	0·93693
Saponification value	178	183·1
Iodine value	94·0	89·4
Reichert-Meissl value	—	1·1
Unsaponifiable	9·22%	6·96%
Melting-point of fatty acids, freed from unsaponifiable	44·4°C.	—
Refraction (butyro-refractometer).	78·0 "degrees."	70·0 "degrees."
Free fatty acids (as oleic)	3·05%	0·5%

The tree producing the beans from which the oil is derived, *Pongamia glabra*, Vent. (*Dahlbergia arborea*. Roxb.), is a widely spread native of East India. The oil has many vernacular names, such as Kanoogoo, Kanuga-Chettu, Kagoo oil, and Houge oil.

Ponticin, a New Glucoside from Rhubarb. E. Gilson (*Bull. de l'Acad. Royal de Med. Belg.*, through *Annales de Pharm.*, **9**, 264) has isolated a new glucoside, ponticin, $C_{21}H_{24}O_9$, from the roots of Austrian and rhapontic rhubarb, both of which are derived from the same plant, a hybrid of *Rheum rhaponticum* and *R. undulatum* ; the larger pieces of the rhizome are known in commerce as Austrian, the smaller as rhapontic

rhubarb. Ponticin is extracted by acetone from the powdered root; it is dissolved by that solvent when amorphous, but after crystallizing becomes insoluble. It occurs in bulky white crystals, becoming yellowish or reddish on exposure to air. When crystalline it is insoluble in water, absolute alcohol, methylic alcohol, acetone, and acetic acid in the cold, also in most other organic solvents, but is soluble in a mixture of water, 4, and acetone, 6. It is also readily dissolved by caustic alkalies and ammonia, but with less facility in alkaline carbonates. It gives a fine red colour with sulphuric acid; with dilute nitric acid a reddish brown, and with the strong acid a brown colour. On boiling with strong hydrochloric acid and cooling, it develops, after a time, a fine rose tint. The solution in aqueous acetone gives a greenish blue reaction with ferric chloride. It becomes brown on heating, and melts with decomposition at about 231°C. It is hydrolized by boiling with dilute sulphuric acid, forming dextrose and pontigenin, $C_{15}H_{14}O_4$, which is soluble in ether and is crystalline. Pontigenin, crystallized from acetic acid or aqueous acetone, occurs in colourless crystals which melt at 187·5°C. It is barely soluble in cold water, slightly more so on heating; insoluble in benzol and petroleum ether, but soluble in other organic solvents. Caustic alkalies and alkaline carbonates, also ammonia, dissolve pontigenin, the solutions becoming brown on exposure to air. The rhubarb which yields ponticin does not contain any tannoids similar to those isolated by the author from Chinese rhubarb root (*Year-Book*, **1903**, 239).

Potassium Cyanide, Silver as an Impurity in. K. Friedrich (*Pharm. Centr.*, **44**, 617) finds that silver is frequently met with as an impurity in potassium cyanide, and that even in a specimen sold as "*Kalium cyanatum purissimum pro analysi*" as much as 0·0012 per cent. was detected. In view of the use of the salt in metallurgical assays, the possible presence of silver as an impurity should be guarded against.

Potassium Ferric Arsenite. L. Dobbin. (*Pharm. Journ.* [4], **18**, 585.) By precipitating ferric chloride with sodium arsenite, collecting and washing the precipitate, and dissolving in just sufficient KOH, evaporating to a syrupy consistence, and scaling on glass, fine scales were obtained which were readily soluble in cold water, but permanent, or nearly so, in the air. The preparation contained 13·14 per cent. of potassium,

15·79 per cent. of iron, and 37·77 per cent. of arsenium, figures which closely agree with the formula $6K_2O$, $5Fe_2O_3$, $9As_2O_3 24H_2O$. Strong solution of ammonia gave an analogous combination when heated with the ferric arsenite precipitate, but dilute ammonia appeared to exert but slight solvent action on it.

Propolis, Constituents of. — Greshoff and J. Sack. (*Bull. Soc. Chim.*, **32**, 511.) Propolis was found to be entirely soluble in boiling alcohol 95 per cent., except about 4 per cent. of impurities. On cooling, the alcoholic solution deposited 12 per cent. of waxy matter, composed chiefly of free cerotic acid, m.p. 78°C., and a small amount of an ester of melissic acid, m.p. 88°C. The alcohol retained propolis resin in solution, from which it was obtained pure by fractional precipitation with ether and petroleum ether. It has the approximate formula $C_{26}H_{26}O_8$; it is acetylizable, giving a di- and tri-acetate. It gives Liebermann's phytosterin reaction.

Psoralea bituminosa, Essential Oil of. (*Schimmel's Report. Oct.*, **1903**, 76.) The dried plant, which was at one time officinal as *Herba trifolii bituminosi*, yielded 0·048 per cent. of a semi-solid essential oil, which was, however, devoid of the odour of the original drug. The oil had the sp. gr. 0·8988 at 25°C.; acid number, 57·18; ester number, 12·25. It contained a fatty acid, m.p. 38–40°C., probably lauric acid.

Pulegone Nitrosite. P. Genvresse. (*Comptes rend.*, **137**, 494.) Pulegone nitrosite, $C_{10}H_{16}O.N_2O_3$, is obtained by passing nitrogen peroxide into a petroleum-ether solution of pulegone kept cold by ice. The oily layer which separates is allowed to stand for 24 hours; it is then separated and steam distilled; after separating the water the oily liquid is set aside to crystallize. When purified by recrystallization from alcohol, it forms silky colourless crystals; m.p. 68–69°C.; $[\alpha]_D + 23°\ 13'$ in $CHCl_3$ solution.

Pyridine, Determination of, in Aqueous Solution. M. François. (*Journ. Pharm. Chim.* [6], **19**, 337.) The determination is based on the fact that in the presence of excess of $AuCl_3$ the double chloride, $C_5H_5N.HCl.AuCl_3$, is invariably formed, and this compound is insoluble in ether, whereas $AuCl_3$ is soluble. Consequently the double salt may be washed free from excess of $AuCl_3$ with that solvent, and weighed after incineration. 196·6 parts of Au are equivalent to 79 parts of pyridine.

An aqueous solution of the base in the form of hydrochloride is prepared, and a quantity taken equivalent to approximately 0·100 Gm. of pyridine. This is placed in a 125 c.c. Bohemian glass cylinder, 20-30 drops of HCl are added, and sufficient excess of pure $AuCl_3$ solution to impart a distinct yellow tint to the mother liquor, after the subsidence of the precipitate formed. The whole is then evaporated to dryness on the water-bath, until all odour of HCl is driven off, the cylinder being at once transferred to a desiccator to cool, to avoid absorption of moisture by the dry hygroscopic residue. When cold, this is rapidly washed by decantation with pure ether free from aldehyde, the washings being passed through a small plain filter, the process being continued until the washings are colourless. The washed residue in the cylinder is then dissolved in water, transferred to a small Saxe capsule, and evaporated to dryness; the filter through which the ether washings have passed is then added, the capsule covered and gently ignited. The cover is then removed, calcination completed, and the residue weighed.

Pyridine may be liberated from its combinations by treatment with an alkali and distillation into water acidified with HCl. The above method of determination may then be followed with the distillate obtained.

Pyridine, Gold Chloride, Compounds of. M. François. (*Journ. Pharm. Chim.* [6], **18**, 110.) The ordinary pyridine auri-hydrochloride, $C_5H_5N.HCl.AuCl_3$, when heated with a large volume of water, 1 : 350, is seen to undergo a change, becoming pale yellow before dissolving. When the solution cools, similar pale crystals separate, which differ in form from the ordinary salt. These were found to have the composition $C_5H_5N.AuCl_3$; that is, the original salt has parted with its molecule of HCl. Anderson has pointed out that pyridine platino-hydrochloride undergoes this change on prolonged boiling with water, but with the gold salt the reaction takes place much more readily. Another pyridine gold compound, $(C_5H_5N)_2.AuCl_3$, is obtained on pouring dry pyridine on dry cold chloride, when rise of temperature occurs; on warming, the compound melts to a reddish-brown liquid, which deposits orange-red crystals as it cools, having the above compound. If the pyridine contain only a trace of water, as little as 0·1 per cent., this red compound is not formed, but a yellow crystalline body, which is the hydrate $(C_5H_5N)_2.AuCl_3.H_2O$. Both these bodies lose half their pyridine

when they are heated to 100°C., and form the compound $C_5H_5N.AuCl_3$ described above, and, like it, they are converted by HCl into the ordinary auri-hydrochloride, $C_5H_5N.HCl.AuCl_3$.

Quinine, Detection of by André's (Thalleioquin) Reaction. E. Léger. (*Journ. Pharm. Chim.* [6], **19,** 281.) The production of the characteristic green colour of thalleioquin is found to depend entirely on the amount of bromine solution employed. If to 10 c.c. of a 0·5 per mille solution of quinine hydrochloride 0·5 c.c. of a mixture of equal volumes of saturated bromine water and distilled water be added, the precipitate at first formed is redissolved on agitation; on now adding 2 drops of AmOH solution a fine emerald green colour is produced. If, however, 1 c.c. of the dilute bromine water, or twice as much as in the preceding experiment, be employed, the reaction is totally different: the colour obtained is not green, but currant red, slowly fading and ultimately becoming green. By adding another 0·5 c.c. to the green solution of the first experiment, it is changed to dull violet; and by adding a trace of bisulphite to the red solution of the second, it passes from red to green. If to another 10 c.c. of the quinine solution 2 c.c. of the bromine reagent be employed, a clear opalescent liquid is obtained, which the addition of 2 drops of AmOH renders transparent, but develops no colour, either green or red.

By using only one drop of the bromine solution the green colour may be obtained with 10 c.c. of a 1 : 20,000 solution of quinine by agitating, then adding, without agitation, one drop of AmOH.

The Swiss and Italian Pharmacopœias have made the test official to determine if the total alkaloids of cinchona bark contain a due proportion of quinine. For this, the 0·5 Gm. of total alkaloids which should be yielded by 10 Gm. of bark are dissolved in 100 c.c. of water, with a few drops of acetic acid. If the bark contain 1 per cent. of quinia, as required by these pharmacopœias, this solution will be equivalent to 0·10 Gm. of that base. A reagent is directed to be prepared by mixing 1 c.c. of freshly prepared solution of bromine and 99 c.c. of distilled water. To 10 c.c. of this reagent 1 c.c. of the alkaloidal solution is added, shaken, then 5 or 6 drops of AmOH are run in. A green colour should be produced. This reaction is given with a 1 : 1,000 solution of quinine. On repeating the test with 0·5 c.c. of the quinine solution no green colour is produced; so that

apparently the limit, as far as the quinine is concerned, is attained. But this is not so ; on again performing the test, using only 0·5 c.c. of the quinine solution and a bromine reagent of half the official strength (1 c.c. of bromine water in 200 c.c. of water), the colour is again obtained almost as brilliant as that with the official solutions. It is evident, therefore, that the reaction depends, not on the amount of quinine, but on the relative amount of bromine present.

Further experiments (*Journ. Pharm. Chim.* [6], **19**, 434) have confirmed the above results, and show that within certain limits the thalleioquin reaction is obtained more markedly the more dilute the solution of quinine is. Thus, with a solution of total alkaloids derived from 5 Gm. of bark, dissolved by means of HCl in 50 c.c. of water, no thalleioquin reaction was obtained with 1 c.c. of the solution, but a fine green colour was given when 0·5 c.c. was taken for the test. Further, with a very dilute Br reagent composed of 1 c.c. of saturated bromine water in 99 c.c. of distilled water, 10 c.c. of this solution gave a fine reaction with 1 c.c. of a 2 per cent. solution of quinine or 5 drops of AmOH, and a markedly less intense reaction with the same quantity of a 6 per cent. solution of the alkaloid.

Quinine Sulphate, Detection of other Cinchona Bases in. (*Supplement to Dutch Pharmacopœia*, through *Pharm. Post*, **36**, 583.) Seventy-five Cgm. of the thoroughly dry salt is dissolved in 40 c.c. of hot water, with the addition of a trace of sulphuric acid, so that red litmus paper gives a bare indication of blue reaction. After the addition of 10 c.c. of a 10 per cent. solution of neutral potassium chromate and thorough cooling, the crystalline precipitate is filtered out through glass wool, and the filtrate treated with 10 drops of solution of caustic soda. After standing for 24 hours the liquid should remain perfectly clear and show no signs of a flocculent precipitate.

Radium Rays, Action of, on Colloids, Hæmoglobin, Ferments, and Red Blood-corpuscles. V. Henri and A. Meyer. (*Comptes rend.*, **138**, 521.) Negatively-charged β-radium rays are without action on negative colloidal silver or positive colloidal ferric hydrate in pure solutions ; but if a trace of an electrolytic salt, such as sodium nitrate, be added, the colloidal silver is unaffected, but the ferric hydrate is precipitated.

Hæmoglobin solutions become transformed into met-hæmo-

globin and are slowly precipitated by exposure to radium rays. Oxycarbonated hæmoglobin remains intact.

Invertin, emulsin, and trypsin all gradually lose their fermentative power on exposure to radium rays, and after several days' treatment become absolutely inert.

Red blood corpuscles are profoundly modified by exposure to radium rays. They give up hæmoglobin and salts to solutions of salts or of sugar, which are without action on normal corpuscles, and their resistance to solvents is generally and greatly diminished.

Radium Rays, Action of, on Viper Venom. C. Phisalix. (*Comptes rend.*, **138,** 526.) Viper venom is affected by exposure to radium rays, just as ferments have been shown to be by V. Henri and A. Mayer (*vide supra*). A 1 : 1,000 solution of the venom in chloroform water, exposed for 6 and for 20 hours to the radiations, were proportionately enfeebled in their toxic energy as compared with a portion of the same solution not so exposed, while a third portion exposed for 58 hours had its toxicity completely destroyed.

Resin Acids of the Conifers. A. Tschirch and G. Schmidt. (*Archiv der Pharm.*, **241,** 585.) The following table shows the resin acids isolated by the first-named author and his collaborators from the hitherto examined coniferous resins :—

Isolated by Means of Ammonium Carbonate.

Name of Acid.	Melting Point.	Formula.	Direct Acid Value.	Saponification Value with Heating.
Picipimarinic Acid	130–135°C.	$C_{12}H_{20}O_2$	286,60	288,00
Mancopalinic Acid	175°C.	$C_8H_{12}O_2$	397,60	397,60
Mancopalenic Acid	100–105°C.	$C_8H_{14}O_2$	392,00	392,00
Palabieninic Acid	110°C.	$C_{13}H_{20}O_2$	187,99	235,50
Kaurinic Acid	192°C.	$C_{10}H_{16}O_2$	330,40	334,60
Canadinic Acid	135–136°C.	$C_{19}H_{34}O_2$	191,82	191,80
Piceapimarinic Acid	130–132°C.	$C_{13}H_{20}O_2$	261,91	262,13
Pimarinic Acid	118–119°C.	$C_{14}H_{22}O_2$	251,94	255,27
Abieninic Acid	114–115°C.	$C_{13}H_{20}O_2$	176,40	257,60
Laricopininic Acid	75–80°C.	$C_{21}H_{30}O_3$	176,97	242,90
α-Abietinic Acid	155°C.	$C_{19}H_{28}O_2$	176,40	245,80
β-Abietinic Acid	158°C.	$C_{19}H_{28}O_2$	173,60	189,00
Beljiabieninic Acid	113–115°C.	$C_{13}H_{20}O_2$	182,28	255,00

ISOLATED BY MEANS OF SODIUM CARBONATE SOLUTION.

Name of Acid.	Melting Point.	Formula.	Direct Acid Value.	Saponification Value with Heating.
α-Mancopalolic Acid	85-90°C.	$C_{10}H_{18}O_2$	325,50	330,40
β-Mancopalolic Acid	83-88°C.	$C_{10}H_{18}O_2$	322,50	330,00
α-Palabietinolic Acid	90-95°C.	$C_{16}H_{24}O_2$	193,76	311,92
β-Palabietinolic Acid	90-95°C.	$C_{16}H_{21}O_2$	190,40	299,04
α-Kaurolic Acid	81-83°C.	$C_{12}H_{20}O_2$	279,30	282,00
β-Kaurolic Acid	85-87°C.	$C_{12}H_{20}O_2$	278,10	282,40
Silveolic Acid	138°C.	$C_{14}H_{20}O_2$	223,60	227,70
Canadolic Acid	143-145°C.	$C_{19}H_{28}O_2$	191,85	328,38
Laricinolic Acid	147-148°C.	$C_{20}H_{30}O_2$	190,40	395,92
Abietolic Acid	145-153°C.	$C_{20}H_{28}O_2$	189,00	350,00
Laricopinonic Acid	97°C.	$C_{20}H_{28}O_4$	181,07	257,20
γ-Abietinic Acid	153-154°C.	$C_{19}H_{28}O_2$	182,00	183,40
Pimaric Acid	144-146°C.	$C_{20}H_{30}O_2$	185,66	185,97
Piceapimaric Acid	144-145°C.	$C_{20}H_{30}O_2$	192,02	191,01
Palabietinic Acid	153-154°C.	$C_{19}H_{28}O_2$	182,00	320,88
α-Abietinolic Acid	95-96°C.	$C_{16}H_{24}O_2$	218,40	285,60
β-Abietinolic Acid	93-94°C.	$C_{16}H_{24}O_2$	217,00	266,00
α-Larinolic Acid	80-81°C.	$C_{15}H_{26}O_2$	198,80	316,40
β-Larinolic Acid	85-86°C.	$C_{18}H_{26}O_2$	196,00	302,40
α-Canadinolic Acid	95°C.	$C_{19}H_{30}O_2$	199,89	200,70
β-Canadinolic Acid	95°C.	$C_{19}H_{30}O_2$	197,79	198,88
α-Piceapimarolic Acid	95°C.	$C_{25}H_{44}O_2$	165,62	165,53
β-Piceapimarolic Acid	94°C.	$C_{25}H_{44}O_2$	165,08	165,31
α-Pimarolic Acid	90-91°C.	$C_{18}H_{26}O_2$	195,91	195,32
β-Pimarolic Acid	89-96°C.	$C_{18}H_{26}O_2$	196,44	198,85
α-Silvinolic Acid	under 100°C.	$C_{15}H_{26}O_2$	229,60	233,00
β-Silvinolic Acid	under 100°C.	$C_{14}H_{24}O_2$	243,60	250,60
α-Picipimarolic Acid	95-96°C.	$C_{18}H_{28}O_2$	200,00	200,00
β-Picipimarolic Acid	93-94°C.	$C_{18}H_{28}O_2$	205,50	207,00
Beljiabietinic Acid	153-154°C.	$C_{19}H_{28}O_2$	182,00	333,20
α-Beljiabietinolic Acid	95-96°C.	$C_{16}H_{24}O_2$	210,00	274,40
β-Beljiabietinolic Acid	95-96°C.	$C_{16}H_{24}O_2$	210,00	257,00

Resin Acids of the Coniferæ. T. H. Easterfield and G. Bagley. (*Proc. Chem. Soc.*, through *Chem. News*, **89**, 259.) The resin acids of the *Coniferæ* as a class have the following points in common: (1) They readily become superfused, and then set to a resin or glass, which crystallizes if fused and maintained for some time at a temperature slightly above the initial melting-point; (2) they nitrate without difficulty in glacial acetic acid solution; (3) in a fused state they readily absorb oxygen from the air; (4) their esterification velocity is extremely low; (5) with hydriodic acid they yield hydrocarbons of nearly the same composition as the diterpenes, with which they have erroneously been regarded as identical.

Colophony, on distillation under diminished pressure or in superheated steam, yields a product which gives analytical results agreeing accurately with those required for abietic acid (m.p. 160–165°C.).

By the slow distillation of abietic acid, even under reduced pressure, a hydrocarbon, $C_{18}H_{28}$, is produced, which is undoubtedly the "colophene" obtained by Deville on distilling colophony, but is not the "colophene" which the same author produced by polymerizing turpentine by means of sulphuric acid. In order to avoid ambiguity, the name "abietene" is proposed for the compound derived from abietic acid.

Krämer and Spilker, by distilling colophony under pressure, obtained a hydrocarbon to which they assigned the formula $C_{18}H_{28}$, regarding it as being derived from abietic acid by the loss of carbon dioxide.

Abietene, $C_{18}H_{28}$, boils at 199–200°C. (13 mm.), 247–250°C. (82 mm.), 340–345°C. (760 mm.), has a sp. gr. 0·973 at 19°/19°C., and $[\eta]_D 1{\cdot}537$ at 20°C.; it is thus identical with the "diterebenthyl" ($C_{20}H_{30}$?) which Renard (*Comptes rend.* [105], **1887,** 865) isolated from resin oil.

Abietene is produced when abietic acid is heated with fuming hydriodic acid at 200°C.; the gases formed at the same time have been analyzed, and were found to consist of 90 per cent. of carbon monoxide and dioxide approximately in the ratio $9CO : 1CO_2$, the volume of oxides of carbon formed after 2 hours' heating being 80 per cent. of that required for the elimination of one carboxyl group from abietic acid.

Abietene, when distilled with one-third of its weight of sulphur, yields a small quantity of retene (m.p. 90°C.), but with twice this proportion of sulphur an isomeric hydrocarbon is obtained melting at 86°C.; at the same time, a hydrocarbon boiling at 330–360°C. (30 mm.) is produced, which is still under examination. If the distillation with sulphur is conducted under reduced pressure, retene is the principal product. These two hydrocarbons are also formed by distilling Merck's "retene puriss." with one fifth of its weight of sulphur.

The foregoing observations support the view that hydrogenerated retenes are probably normal constituents of resin oil (*Berichte* [22], **1899,** 3368; [36], **1903,** 647), and that resin oil is undoubtedly a hydrogenerated retene.

This conclusion is further strengthened by the observation that abietene, when reduced with hydriodic acid and excess of

phosphorus at 240°C., takes up two atoms of hydrogen and yields a hydrocarbon, dihydroabietene, which appears to be identical with the dodecahydroretene obtained by Liebermann and Spiegel (*Berichte* [22], **1889,** 779) by reducing retene under similar circumstances.

The above observations lead to the conclusion that abietic acid is decahydroretenecarboxylic acid, but the accepted formula for retene would not account for its low esterification velocity. There is, however, no experimental evidence for the assumed para-position of the methyl and *iso*propyl groups in retene. That these groups are really in the meta-position in abietic acid and in retene is rendered probable by the observation of Kolbe (*Berichte* [13], **1880,** 888) that resin spirit is rich in *m*-cymene, but contains only small quantities of ordinary cymene.

Resins, Method for Determining the Solubility of, in Various Liquids. R. Dieterich. (*Helfenberger Annalen,* through *Annales de Pharm.*, **9,** 447.) One or 2 Gm. of the finely powdered resin is mixed with a little washed sand or powdered glass and twisted up or folded in a piece of filter paper, which is then placed in a small muslin bag. The whole is dried and weighed. It is then suspended in the solvent, contained in a wide-mouth bottle, so that the packet of resin is plunged in the liquid half way up, or so that the solvent does not come above the folds of the paper. After leaving in contact for a day, the solvent is replaced by a fresh portion, and the process repeated until solution is complete. The muslin bag is then withdrawn, washed with the solvent, dried and weighed. By this method results were obtained with dammar and olibanum which do not accord with the figures for solubility previously published by other workers.

Rhodinol, Synthesis of. L. Bouveault and —Gourmand. (*Comptes rend.*, **138,** 1699.) Synthetic geranic acid was hydrogenized and the product distilled at normal pressure, whereby the unacted-on geranic acid was decomposed, while the rhodinic acid was unaffected. The latter was extracted as its sodium salt from the accompanying decomposition products, regenerated and distilled *in vacuo.* It distilled at 146°C. under 10 mm. The acid thus obtained was converted into its ethyl ester, a colourless liquid of fruity odour, boiling at 115°C. under 10 mm. pressure. This ester was then converted into the corresponding alcohol by treatment with sodium and absolute alcohol.

The rhodinol, $C_{10}H_{20}O$, thus obtained resembled natural rhodinol in every respect except that it was optically inactive. It is, in fact, racemic rhodinol. It has a powerful rose-like odour, boils at 110°C. under 10 mm. pressure, and has the sp. gr. 0·877 at 4°C. It forms a pyruvic ester, boiling at 143°C. under 10 mm. pressure. This ester gives a crystalline semicarbazone melting at 112°C., the same m.p. as that of the semicarbazone of natural rhodinyl peruvate. The two semicarbazones, when mixed, melt at the same temperature. This synthesis establishes the individuality of rhodinol, as distinguished from lævo-citronellol, and refutes the contention of Tiemann and Schmidt that the two alcohols are identical.

Rhubarb Rhizome Cultivated in Berne, Constituents of. P. A. A. F. Eijken. (*Pharm. Weekblad*, **41**, 177, 197.) The rhizome of *Rheum palmatum β-tanguticum*, cultivated in Berne, was found to contain emodin, m.p. 250°C.; iso-emodin, $C_{15}H_{10}O_5$, crystallizing from toluol in orange-red needles, m.p. 212°C.; rhein, $C_{15}H_8O_8$, in yellow crystals from pyridine, m.p. 314°C.; chrysophanic acid, m.p. 162°C., and anthraglucosides, which yield chrysophanic acid, emodin, and rhein on hydrolysis with dilute acids. *Rheum officinale, Baill.* rhizome contained the same constituents except emodin; the roots also contained chrysophanic acid, isoemodin, and rhein.

Rhus glabra Seeds, Fixed Oil of. G. B. Frankforter and A. W. Martin. (*Amer. Journ. Pharm.*, **76**, 15.) The ether extracted oil from the husked seeds of *Rhus glabra* is a light yellow, mobile liquid, with a peculiar odour and pleasant taste; the yield is 9·1 per cent. It becomes viscous at −14°C. and solid at −24°C. It has the following characters: Refraction index, 1·48821 at 0°C. and 1·48228 at 15°C.; sp. gr. 0·9203 at 20°C. and 0·9312 at 0°C.; saponification number, 190–200; iodine number, 85·96–87·86. It contains a small quantity of a non-saponifiable monatomic alcohol, probably a cholesterol.

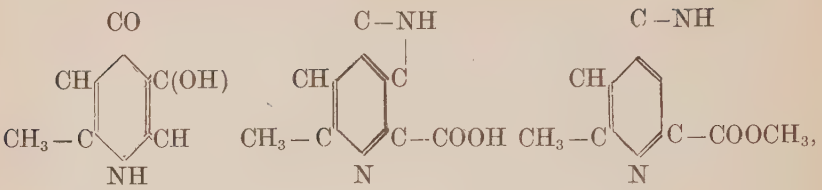
The husk was ground and extracted with water, which removed tannin and calcium acid malate. The dried marc then yielded to ether 8·5 per cent. of black oil. It was semisolid at 20°C., when the sp. gr. was 0·9412; it was liquid at 35°C., at which temperature the sp. gr. was 0·933. It had the saponification number 179·7; iodine number, 87·2. When treated with acetone 80 per cent. it dissolved, the insoluble portion being a

block semisolid oil. The oil obtained on distilling off the acetone was light yellow in colour.

Ricinine. L. Maquenne and L. Philippe. (*Comptes rend.*, **138,** 506.) Although ricinine, which was isolated by Tuson from castor oil seeds in 1864, and from the young shoots of the plant by Schultze in 1897, has since been investigated several times, no concordant figures have been obtained for its formula. The authors have obtained it in a pure crystalline state by extracting castor oil presscake with boiling water, concentrating the watery solutions to a syrup, extracting this with alcohol, evaporating the alcoholic solution *in vacuo*, and again extracting the residue with boiling $CHCl_3$. On evaporation this deposits the ricinine in a crystalline form; when purified by recrystallization it has the formula $C_8H_8N_2O_2$. On saponifying with KOH it yields 18·6 per cent. of methyl alcohol. The alkaline liquid left, when acidified with HCl, throws down an abundant precipitate of ricininic acid, $C_7H_6N_2O_2$. When crystallized from warm water it forms fine brilliant needles, almost insoluble in cold water, which decompose at about 320°C. without fusing. When heated in sealed tubes to 150°C. with HCl, ricininic acid is decomposed, evolving CO_2, forming ammonium chloride and a new crystalline hydrochloride, which is readily removed on account of its extreme solubility in absolute alcohol. This body has the formula $C_6H_7NO_2.HCl.+2H_2O$ when crystallized from water. It forms bulky transparent prisms which melt at 65–70°C. These effloresce in the air and rapidly become anhydrous at 110°C., losing a trace of HCl; they melt at 155–160°C. The base is readily liberated from this salt by ammonia; it crystallizes from water in colourless needles, having the formula $C_6H_7NO_2.H_2O$, m.p. 80°C., and, when anhydrous, 170–171°C. The decomposition of ricininic acid is represented by the equation

$$C_7H_6N_2O_2+2H_2O = NH_3+CO_2+C_6H_7NO_2.$$

The new base, $C_6H_7NO_2$, apparently contains a closed chain; since it is coloured deep red by Fe_2Cl_6, it appears to be a methyldioxypyridine or methyldioxypyridone, $C_5H_4NO_2.CH_3$. It follows from the above results that ricininic acid is probably the carboxyl derivative of imino methylpiridine. The formula for that body and ricinine may be expressed as follows, provided that subsequent experiments confirm the position assigned to the substituting groups :—



Methyloxypyridone. Ricininic Acid. Ricinine.

Robinin. N. Waliaschko. (*Journ. Russ. Phys. Chem.*, through *Chem. Centr.* [1], **1904,** 1609.) Robinin is extracted from fresh acacia flowers by boiling water, or from the dried flowers with alcohol. It has the formula $C_{33}H_{40}O_{19} + 7\frac{1}{2}H_2O$. It is hydrolized by mineral acids, forming 2 mols. of rhamnose, 1 mol. of galactose, and 1 mol. of robigenin, thus :—

$$C_{33}H_{40}O_{19} + 3H_2O = C_{15}H_{10}O_6 + C_6H_{12}O_6 + 2C_6H_{12}O_6.$$

Robigenin, $C_{15}H_{10}O_6 + H_2O$, is a yellow colouring matter which parts with its water at 130°C. and melts at 270°C.

Rose Oil, Two New Constituents of. H. von Soden and W. Treff. (*Berichte,* **37,** 1094.) In addition to the hitherto reported constituents, the authors find that rose oil contains about 1 per cent. of eugenol and about 1 per cent. of an aliphatic primary sesquiterpene alcohol, $C_{15}H_{26}O$, identical with farnesol. It is a mobile colourless oil of a floral and somewhat cedar-like odour. It is optically inactive, has the sp. gr. 0·894, and boils, under 4 mm. pressure, at 149°C.

Rose Oil, the Iodine Absorption of. F. Hudson Cox and W. H. Simmonds. (*Analyst,* **29,** 175.) Genuine otto of rose is found to have the Huebl value 187–194. "Synthetic" rose oil, with stearoptene, 221–254; without stearoptene, 261–279. Stearoptene has no iodine absorption. Palma-rosa oil shows the value 296–307; African geranium oil, 213–225; Bourbon geranium oil, 213–215; Spanish geranium oil, 211; geraniol, probably natural, 239; geraniol, probably "synthetic" geraniol, 307; citronella oil, 217; citronellol, 187; linalol, 280; citral, 175; guaiacum wood oil, 298. Except citronellol and citral, all the above substances, which may be employed to adulterate otto of rose, have iodine values well over 200. Geranium oil, although its iodine value is relatively low, would be readily detected by the large amount of esters it contains.

The test is thus performed: From 0·1 to 0·2 Gm. of the oil

to be tested, dissolved in 10 c.c. of alcohol 90 per cent., is treated with 25 c.c. of Huebl's reagent. After standing for 3 hours the uncombined iodine is titrated in the usual manner. Temperature between 4°C. and 27°C. is not found to materially affect the result; but the age of the Huebl reagent has an important bearing, old solutions being much less active. It is recommended to keep the iodine and mercuric chloride solutions separate, mixing them immediately before use. The titration should be performed as rapidly as possible, otherwise the iodine colour-reaction will redevelop. Eight samples of sophisticated or doubtful ottos gave iodine values ranging from 234 to 133. Two, in which the addition of geraniol was suspected, showed 219 and 212; one, containing ethyl alcohol, only 133; a mixture of 1 part of "synthetic" otto and 2 parts of genuine had the iodine value 215.

Saccharimetry, Sodium Monosulphide or Potassium Ferrocyanide as Indicators in. L. Beulaygue. (*Comptes rend.*, **138,** 51.) In performing the titration of saccharine solutions with Fehling's reagent, the correct observation of the end of the reaction is an admitted difficulty. The author proposes to overcome this in the following simple manner: When the reaction is nearing completion a little of the hot liquid is spotted out on to two superimposed white filter papers. The upper paper serves as a filter, retaining the particles of cuprous oxide. The lower one is withdrawn, and to the moist spot a drop of freshly prepared sodium monosulphide is applied. The process is repeated, after continuing titration in the usual manner, until the under spot no longer gives a black colour with the monosulphide solution. This sharply indicates the end of the reaction. Potassium ferrocyanide, acidified with hydrochloric or acetic acid, may be used instead of the sodium monosulphide, when the colour will, of course, be red as long as any unreduced copper is in the solution.

Saccharin, Detection of, in Beers and Wines. — Boucher and — Boungne. (*Bull. Soc. Chim.*, **29,** 411.) Tannin and colouring matter in beer and wine are destroyed by oxidation with permanganate before shaking out the saccharin with ether. Beer is first acidified with a few drops of H_2SO_4, then treated, in the cold, with excess 1 per cent. solution of $KMnO_4$; when reaction ceases, excess of the oxidizing agent is removed by the addition of SO_2 and the liquid shaken out with ether in the usual

manner. Wine is treated in a similar manner, but with the application of heat. It is not necessary to effect the complete decoloration of the liquid as in the case of beer. Not only does this preliminary treatment destroy tannin and colouring bodies, but also salicylic acid, which, if present, may vitiate the results. The liquid thus treated does not form an emulsion when shaken out with ether.

Salicylic Acid, Detection of Minute Traces of. P. Merl. (*Pharm. Zeit.*, **49,** 298, after *Pharm. Praxis.*) The acid is shaken out in the usual manner with a mixture of ether and petroleum ether. Narrow strips of filter paper, previously moistened with very dilute Fe_2Cl_6 solution, are placed in the immiscible solvent in such a manner that the ends project beyond the surface of liquid. In a short time a characteristic violet colour zone is produced on the upper portion of the strips if salicylic acid be present.

Salicylic Acid, Presence of, in the Violaceæ, the Marigold, and in Cherries. A. Desmoulière. (*Journ. Pharm. Chim.* [6], **19,** 121.) It is shown that the salicylic acid present in the plant *Viola tricolor* occurs as methyl salicylate, and further, that this ester is the result of the hydrolizing action of a ferment on a glucoside. The latter could not be isolated in a crystalline form, but was obtained in an amorphous condition, as follows: The crushed fresh plant was thrown into boiling alcohol 95 per cent. to destroy the ferment. The alcoholic extract thus obtained was distilled with $CaCO_3$, the residue taken up with alcohol and precipitated with $Pb2C_2H_3O_2$. After filtration, excess of Pb was removed by means of H_2S, and the latter eliminated by a current of air, the liquid concentrated, extracted by alcohol, and the alcoholic solution precipitated by ether. The glucoside thus obtained gave methyl salicylate when hydrolized with dilute H_2SO_4, and also by the specific ferment of the plant contained in the tissues after removing the alcohol- and ether-soluble constituents.

Calendula officinalis is found to contain 0·43 Mgm. of salicylic acid per kilo. of fresh plants. Various garden cherries yield from 0·1 to 0·2 Mgm. per kilo., and wild cherries 0·21 Mgm. per kilo. The presence of the acid in the last is of some importance, since these cherries are largely used for the preparation of certain syrups; the presence of traces of salicylic acid in these would not therefore be evidence of sophistication.

Saliva, Detection of Sulphocyanide in, by Means of HgCl. E. Polacci. (*Annales de Chim. Analyt.*, **9,** 162.) Calomel affords a very sensitive reaction with sulphocyanides, which takes place according to the equation $2HgCl + 2KCNS = Hg + Hg2CNS + 2KCl$. The mercury thus set free forms a greyish mixture. If a few drops of saliva be rubbed down in a porcelain capsule with a few grains of calomel, the reaction will be observed to take place in a few minutes. The supernatant liquid also gives the characteristic blood-red reaction for sulphocyanides with Fe_2Cl_6. The alkalinity of the saliva plays no part in the reaction, since it occurs as well if the secretion be first rendered acid. Other acid organic secretions, gastric and muscular juice and the cephalo-rachidian fluid, also reduce calomel.

Salmon Oil. B. de Greiff. (*Chem. Rev.*, **10,** 223, through *Analyst*, **28,** 365.) This oil, which is produced in considerable quantities in British Columbia, is a pale golden-yellow liquid, with a mild, fish-like odour and a comparatively agreeable taste. Its constants are as follows: Sp. gr. at 15·5°/15·5°C., 0·92586; saponification number, 182·8; Reichert-Meissl number, 0·55; Hehner number, 95·02; iodine value, 161·42; iodine value of the liquid acids, 197·4; unsaponifiable matter, 4·4 per cent.; and acid number, 4·98.

Sandal Wood Oil, East Indian, Physical Characters of. E. J. Parry and C. T. Bennett. (*Chem. and Drugg.*, **64,** 202.) The physical characters of the acetylized oil, prepared in order to determine the santalol-value, are very constant, and appear to differ from those of the oil itself only through the direct influence of the acetic acid introduced into combination, and would be materially affected by the presence of non-acetylizable constituents.

The following figures were obtained from six samples of sandal oil after acetylization :—

—	Sp. Gr. at 15°C.	Rotation (100 mm.).	Refractive Index at 20°C.
1. English . .	0·986	—	1·4916
2. Dutch . .	0·9875	−14°	1·4915
3. German . .	0·9860	−14°	1·4895
4. English . .	0·9880	−14° 30′	1·4894
5. English . .	0·9870	−14° 10′	1·4899
6. English . .	0·9885	−13° 50′	1·4900

Four samples of the original natural oils were distilled in fractions of 10 per cent. under reduced pressure, and the various fractions examined. The following figures were obtained :—

	A.			B.		
—	Sp. Gr.	Rotation.	Ref. Index.	Sp. Gr.	Rotation.	Ref. Index.
1	0·970	−19° 30′	1·5055	0·975	−19°	1·5060
2	0·970	−17° 20′	1·5060	0·969	−18°	1·5044
3	0·972	−16°	1·5060	0·969	−18°	1·5068
4	0·974	−16°	1·5065	0·972	−16°	1·5070
5	0·977	−15° 30′	1·5068	0·976	−14°	1·5072
6	0·978	−15°	1·5068	0·979	−15° 30′	1·5080
7	0·980	−16° 40′	1·5079	0·982	−16°	1·5080
8	0·980	−18°	1·5080	0·984	−17° 20′	1·5075
9	0·984	−21°	1·5084	0·982	−21° 30′	1·5085
Residue	—	—	—	—	—	—

	C.			D.		
—	Sp. Gr.	Rotation.	Ref. Index.	Sp. Gr.	Rotation.	Ref. Index.
1	(contained some water)	− 21°	1·5067	0·977	−18°	1·5078
2	0·970	−17°	1·5064	0·964	−17°	1·5038
3	0·970	−15°	1·5063	0·969	−16	1·5051
4	0·974	−15°	1·5071	0·975	−15°	1·5068
5	0·977	−15°	1·5075	0·979	−15°	1·5072
6	0·978	−15°	1·5080	0·980	−14°	1·5078
7	0·978	−15°	1·5080	0·981	−16°	1·5083
8	0·979	−17°	1·5082	0·981	−18°	1·5083
9	0·980	−20°	1·5086	0·978	−22°	1·5086
Residue	0·988	—	1·5123	—	—	—

The refractive index of pure sandal wood oil, as shown by the examination of eight samples, is about 1·5060, and should never fall below 1·5030. The limits in the eight samples were 1·5040–1·5075. It is clear from an examination that no fraction should ever be obtained with a refractive index below 1·5000, and the optical rotation (if the oil be distilled in ten fractions) should vary only within very narrow limits.

Sapium sebiferum Seeds, Fixed Oil of; Chinese Tallow Seed

Oil. L. M. Nash. (*Analyst*, **29**, 110.) Chinese tallow-seed oil is obtained from the seeds of *Sapium sebiferum* (syn. *Stillingia sebifera*), a tree of the natural order *Euphorbiaceæ*. This tree, which is indigenous to China and the adjacent islands, is known as the "tallow-tree." It has been found to grow well in North India, and has also been introduced into South Carolina.

The vegetable tallow, known to the natives as "pi-yu," is commonly extracted by the following method: The kernels, after being carefully removed from the hard outer shells, are placed in a large wooden drum provided with a number of holes. A current of steam is passed through the drum, when the melted tallow runs out into a receptacle placed beneath it. After the tallow has solidified it is again melted, filtered, and cut into cakes weighing about 1 cwt. each, in which form it is exported to Europe.

"Tsé-iéou" or "ting-yu" is the name given to the liquid oil extracted by expression from the kernels left after the operation just described; this possesses drying properties. The yield of oil is about 59·5 per cent. It is used as an illuminant and in the manufacture of varnish.

"Mou-iéou" is a mixture of "pi-yu" and "ting-yu," obtained from the whole seeds by a combination of the above processes. Both "mou-iéou" and "pi-yu" are sold under the name of Chinese vegetable-tallow, but the former is not so hard or white as the latter.

The sample of tallow-seed oil examined was of a brown colour and had an odour resembling that of wood oil. Its viscosity, measured at 15·5°C., is about three-fifths that of rape oil. When cooled to 0°C. no stearine is deposited. A film of the oil on glass becomes nearly dry in 3 days and quite hard in 6 days; it must therefore be classed among the drying oils.

The following results were obtained from the examination of the sample: Sp. gr. at $\frac{15{\cdot}5\ \text{C.}}{15{\cdot}5\ \text{C.}}$ 0·9395; free fatty acids (as oleic), 3·1 per cent.; unsaponifiable matter, 0·44 per cent.; saponification equivalent, 277; iodine absorption (Huebl), 160·7; iodine absorption of fatty acids, 165; Hehner number, 94·4; insoluble fatty acids, 93·96 per cent.; combining weight of fatty acids, 272; rotatory power (in 100-millimetre tube), about $[a]_D$ — 4°; Zeiss-butyro figure at 20°C., 89·1; refractive index $[\nu]_D$ at 20°C., 1·4835.

The fatty acids, on cooling and standing, separate into a solid and a liquid portion.

The oil gives no very distinctive colour reaction with sulphuric acid. One drop of the concentrated acid on 20 drops of the oil gives a red-brown coloration, changing, on stirring, to a muddy-brown, and finally to a very dark brown.

Sesquiterpenes, Action of Paraformaldehyde on. P. Genvresse. (*Comptes rend.*, **138**, 1228.) Caryophyllene, clovene, and cadinene combine molecule to molecule with formaldehyde, giving compounds having the common formula $C_{16}H_{26}O$. The sesquiterpene is heated in a Pfungst tube, with a molecular weight of paraform to 180-200°C. for 10 hours. The uncombined sesquiterpene and paraform are then removed by steam distillation, the new compound being left in the residue. This is then extracted with ether, the solvent distilled off, and the new body distilled under reduced pressure. The *caryophyllene* compound boils at 177–178°C. under 15 mm. It is a golden yellow, slightly viscous liquid; sp. gr. 0·997 at 0°C.; $[\alpha]_D -7° 40'$; $[\eta]_D$ 1,508. When acetylized it forms the ester $C_{16}H_{25}OCOCH_3$, which is more fluid than the alcohol; b.p. 185°C. under 15 mm.; sp. gr. 0·9969 at 0°C.; $[\alpha]_D +20° 33'$; $[\eta]_D$ 1,490. The *clovene* compound, obtained in a precisely similar manner, has the b.p. 170°C. under 12 mm.; $[\eta]_D$ 1,5105; sp. gr. 1·001 at 0°C.; $[\alpha]_D -7°12'$. The *cadinene* alcohol boils at 180°C. under 15 mm., is yellow in colour, and has a totally different odour from that of the other isomers. Its $[\eta]_D$ is 1,521; sp. gr. 0·993 at 0°C.; $[\alpha]_D -17° 54'$.

Sesquiterpenes, Characterization and Classification of. O. Schreiner. (*Proc. Amer. Pharm. Assoc.*, **51**, 350.) Tables are given showing the occurrence of sesquiterpenes in 30 families, 58 genera, and 72 species of plants. It is shown that cadinene in the pine family is restricted to the leaves. Two distinct sesquiterpenes may occur in two different parts of the same plant, as in the case of *Juniperus virginiana*, where cadinene occurs in the leaves and cedrene in the wood. It is also noteworthy that different sesquiterpenes may occur in closely related species; for instance, *Piper nigrum* contains caryophyllene and *Piper cubeba* cadinene. Tables showing the physical characters of the known sesquiterpenes are given, and their classification dealt with.

Siberian Fir, Essential Oil of. — Golubew. (*Prot. Russ.*,

Phys. Chem. Gesellsch., through *Pharm. Zeit.*, **49**, 258.) The fraction of the essential oil of Siberian fir, boiling at 162°C., consists of camphene. It also contains bornyl acetate in the higher boiling fractions. By saponifying the bornyl ester fractions and treating the borneol thus liberated with HCl, sp. gr. 1·4, camphor was obtained.

Silicon, Action of, on Water, at near 100°C. H. Moissan and F. Siemens. (*Comptes rend.*, **138**, 939.) Although it has been generally considered that pure silicon is inert towards water at 100C., it was observed that when pure crystalline or amorphous silicon were kept in contact with water for 6 or 8 hours at 95°C. in a glass tube, a distinct decomposition of the water occurred and hydrated silica was formed. When very fine transparent crystals of silicon were employed, these were seen, at the end of the experiment, to be surrounded with a distinct envelope of transparent silica. The gas evolved was proved to be hydrogen. On repeating the experiment, using, however, a platinum vessel and water distilled through a platinum coil, no such reaction was obtained. Nor was any decomposition observed when a tube of silica was substituted for that of glass, and even in the glass tube no reaction took place if the water was first rendered feebly acid. It is therefore concluded that the observed reaction in the first experiment was not due to direct action between the silicon and the water, but was started by the minute trace of alkali dissolved by the water from the glass, thus :—

$$Si + 2NaOH + H_2O = SiO_2Na + 2H_2.$$

The sodium silicate thus formed is then dissociated, liberating sodium hydrate, which attacks a fresh portion of silica. The results point to the fact that the presence of a minute trace of alkali derived from glass apparatus may, in certain cases, vitiate the results of delicate chemical investigations.

Sodium Arsenate and Lead Acetate, the Interaction of. L. Dobbin. (*Pharm. Journ.* [4], **18**, 582.) It is found that when ordinary sodium arsenate and lead acetate interact in aqueous solution, normal lead arsenate is at first the chief product, despite the fact that the mixture becomes slightly acid owing to liberation of acetic acid.

In the presence of added acetic acid, even in compara-

tively small quantity, the formation of normal lead arsenate is so seriously interfered with that acid lead arsenate largely predominates in the precipitate.

The official quantitative test of purity of sodium arsenate is substantially, although not strictly, accurate.

No evidence of the solubility of acid lead arsenate in dilute acetic acid was obtained. On the contrary, when lead acetate was added to solution of sodium arsenate containing the proportion of acid laid down in the official test, but with the precaution that the sodium arsenate should remain in slight excess, there was no perceptible darkening of the filtrate when it was treated in the cold with hydrogen sulphide. It seems probable that the supposed solubility of lead arsenate in acetic acid, as noted by Barrie (*Pharm. Journ.* [4], **18,** 85) was really due to the conversion of normal into acid lead arsenate with formation of lead acetate in solution, in accordance with the equation :—

$$Pb_3(AsO_4)_2 + 2HC_2H_3O_2 = 2PbHAsO_4 + Pb(C_2H_3O_2)_2.$$

Details of experiments in support of these conclusions are given.

Sodium Arsenate, Official, and Solution of Sodium Arsenate. W. A. H. Naylor. (*Pharm. Journ.* [4], **18,** 363.) The method for the determination of arsenates described by the author (*Year-Book*, **1880,** 104) is applicable to the *Liquor Sodii Arsenatis*, B.P.

The process can be carried out simply in the following manner : A bottle with a wide neck and capable of holding about 50 c.c. is placed in a jar about an inch taller than the bottle. In the bottle the *Liquor sodii arsenatis* is placed (10 c.c.). In the jar dilute hydrochloric acid is placed, and by the addition of marble during the process the bottle is kept in an atmosphere of carbon dioxide. 5 c.c. of 20 per cent. hydriodic acid solution is added to the arsenic solution, together with a little starch mucilage. The iodine as it is liberated is titrated by N/10 sodium thiosulphate. After the iodine colour has disappeared it is advisable to wait 15 minutes before reading the burette. The titration may also be conveniently carried out in an atmosphere of coal gas by using a wide-mouthed bottle, closed by a cork bored with three holes. Through one hole the end of the burette passes, and through the others the inlet and exit tubes for the coal gas. The burette should be as far removed from the other tubes as possible. 1 c.c. of thiosulphate = 0·0093 Gm. anhydrous

sodium arsenate. The jar used should be of as light a colour as possible inside, so that the iodine colour can be easily seen. The hydriodic acid is conveniently prepared by dissolving 25 grs. of potassium iodine in 80 m of water, and adding 20 m of hydrochloric acid (1·16) to the solution. The sodium arsenate used in the control experiments, analyzed gravimetrically, was found to be pure.

When titrated as described above it gave 99·84 per cent. of Na_2HAsO_4. Some samples of Liquor Sodii Arsenatis were then titrated, 10 c.c. being used for each titration.

Sample.	Na_2HAsO_4.	Mean.
1.	{1·004 / 0·973}	0·988
2.	{1·01 / 0·977}	0·993
3.	{0·90 / 0·93}	0·915
4.	{1·02 / 0·986}	1·003
5.	{0·874 / 0·847}	0·860
6.	{0·967 / 0·976}	0·971
7.	{0·967 / 0·958}	0·962
8.	{0·958 / 0·958}	0·958

No. 1 was a specially prepared sample, the rest were trade samples.

The Pharmacopœia states that 1 Gm. of sodium arsenate dissolved in 50 c.c. of water and 1 c.c. of acetic acid should require 2·03 Gm. of lead acetate for complete precipitation. Barrie (*Chem. and Drugg.*, **56,** 884) states that 3·05 Gm. of lead acetate are required to precipitate 1 Gm. of anhydrous sodium arsenate. He used plain water as a solvent, as lead arsenate is somewhat soluble in acetic acid. This point was investigated, and it has been found that the apparent discrepancy recorded above is due to acetic acid being used in one case and not in the other. In the presence of the Pharmacopœia proportion of acetic acid 2·03 Gm. of lead acetate precipitates 1 Gm. of sodium arsenate, while in the absence of acetic acid, 3·05 Gm. of lead acetate is required. It is to be noted that the official instructions do not embody a definite statement as to the form in

which the lead acetate is to be added to the acidified solution of the arsenate. It may be assumed that the weighed quantity of lead acetate in the form of crystal may be thrown into the solution or it may be first reduced to powder. It may not be assumed that the lead acetate may be dissolved in a portion of the acetic acid and water prescribed for the dissolution of the alkaline arsenate. The two following experiments show that the result obtained is practically the same, whether the lead acetate be used in the form of fine powder or in solution :—

1. 1 Gm. of sodium arsenate was dissolved in 50 c.c. of water and 1 c.c. of acetic acid, 2·03 Gm. of lead acetate in fine powder was then added and the solution shaken. After 15 minutes the solution was filtered, the precipitate washed, and the arsenate estimated in the filtrate. The amount found, calculated as sodium arsenate, was 0·026 Gm.

2. 1 Gm. of sodium arsenate was dissolved in 25 c.c. of water and 1 c.c. acetic acid, and 2·03 Gm. of lead acetate dissolved in 25 c.c. of water were added. The arsenate in solution was estimated as before ; 0·0209 Gm. was found.

It is stated by Barrie and in the Research List of the British Pharmaceutical Conference, **1903,** that a process is wanted for the better assay of sodium arsenate and the *Liquor sodii arsenatis*. The figures here adduced show that this process meets the requirement.

Sparteine. C. Moureu and A. Valeur. (*Journ. Pharm. Chim.* [6], **18,** 502.) Sparteine distils in a current of hydrogen, without decomposition, at 325° C. It has the sp. gr. 1·0196 at 20°C. ; $[\alpha]_D$ −16° 42′ ; $[\eta]_D$ 1·5293 at 19° C. Solubility in water at 22°C., 0·304 : 100, but readily soluble in most other solvents. It is easily distilled with steam. It becomes altered on exposure to the air, becoming brown. Elementary analysis confirms the formula originally given to it by its discoverer, Stenhouse, in 1851, $C_{15}H_{26}N$. It is a very powerful base. It may be titrated by standard acids. Towards helianthin it acts as a diacid base, towards phenolphthalein as a monoacid base ; so that by using first phenolphthalein each molecule of the base may be observed to saturate 2 molecules of the acid in succession ; the same occurs with litmus ; towards this indicator sparteine is monobasic. Being dibasic, sparteine forms neutral and acid salts. The official (Codex) salt is the neutral sulphate, $C_{15}H_{26}N_2H_2SO_4+5H_2O$; the platinochloride occurs in regular prisms,

having the formula $C_{15}H_{26}N_2.2HClPtCl_4 + 2H_2O$. The picrate, which resembles potassium picrate in appearance, has the formula $C_{15}H_{26}N_2.2[C_6H_2(NO_2)(OH)_3]$; it melts with decomposition at 208° C. The authors conclude from the behaviour of the iodomethylate towards acids that sparteine is a bi-tertiary diamine.

Sparteine Sulphate, its Composition and Volumetric Determination. C. Moureu and A. Valeur. (*Journ. Pharm. Chim.* [6]. **18**, 545.) Although the official (Codex) sparteine sulphate has the formula $C_{15}H_{26}N_2.H_2SO_4.5H_2O$, it only loses 4 molecules of water at normal temperatures, *in vacuo*, over H_2SO_4. Since sparteine is a monoacid base to phenolphthalein, the official salt shows a free acid reaction, equivalent to half the acid in the molecule, towards that indicator, so that it may be titrated with standard alkali, one molecular weight of which will be equivalent to a molecular weight of sparteine as sulphate.

Spike (Lavender) Oil, Adulterated. E. J. Parry and C. T. Bennett. (*Chem. and Drugg.*, **63**, 1011.) Very large quantities of adulterated spike oil have appeared on the market, apparently specially prepared to pass the ordinary tests to which spike oil is usually subjected. The sp. gr., optical rotation, and solubility are within the limits given by most authorities for this oil, but a fuller examination reveals the presence of some one or more foreign bodies.

The sp. gr. of pure spike oil is somewhat variable, so that in this respect no alteration in the usually adopted figures of, say, 0·904-0·915 is possible. The optical rotation is usually given as up to + 7°. Samples with a rotation over + 5° are very suspicious, and + 4° is the usual upper limit.

The solubility figure, however, requires some revision. Pure spike oils have been mixed with 25 per cent. of certain cheap adulterants without causing them to vary outside the limits of sp. gr., optical rotation, and the usually accepted solubility. By reducing the 70 per cent. alcohol to 65 per cent. (a more extended examination may render it possible to reduce this to even 60 per cent.), and using 6 volumes at 15°C., it is found that pure oils are soluble, whilst additions of 5 10 per cent. of most adulterants disturb this solubility. It is therefore proposed that the standard alcohol used for the solubility test with this oil be reduced to 6 volumes of 65 per cent. strength. In order to guard further against the addition of carefully prepared

mixtures which might pass these requirements, a fractional distillation should be made and the various fractions be fully examined.

The usual adulterants are turpentine, oil of rosemary of the commonest quality, and safrol. In one sample recently examined, a fraction was obtained boiling between 230 and 240°C., which had a sp. gr. of 0·986, was optically inactive, and had a refractive index 1·4980. Its odour was very marked, and was sufficient to identify it as being chiefly safrol, with which the physical characters are in complete accord. [?The sp. gr. of safrol is 1·108 at 15°C.—Ed. *Year-Book*.] Fractional distillation will reveal practically any adulterant that is likely to be added to spike oil in sufficient quantity to be remunerative. The percentage of esters and alcohols present should also be determined, as these figures will give useful information if rosemary oil is suspected.

Spilanthes oleracea, Constituents of. E. Gerber. (*Archiv der Pharm.*, **241,** 270.) Para cress, *Spilanthes oleracea*, is found to contain an essential oil, chiefly composed of a sesquiterpene, *spilanthene*, boiling at 220–225°C. at normal pressure, which gave the dibromo-compound, $C_{15}H_{30}Br_2$. The active principle appears to be *spilanthol*, $C_{37}H_{61}N_2O_3$, which could only be obtained in an amorphous state. By decomposition this furnishes a base, $C_4H_{11}N$, which appears to be closely allied to isobutylamine, although its gold hydrochloride compound melts at 154–156°C., whereas that of iosbutylamine melts at 131–135°C. This base is combined with an acid, $C_{14}H_{27}O_2$, apparently belonging to the fatty acid series. The ethereal extract, deprived of fat, deposits a crystalline body, which appears to be that found by Walz, but from which it is difficult to remove traces of spilanthol, which give it a bitter taste. This body, $C_{23}H_{44}O$, melts at 132–133°C., and is probably a phytosterin. The fatty matter is chiefly composed of a glyceride of cerotic acid. All the above constituents were isolated from the ethereal extract of the drug.

Stipa vaseyi, a Narcotic Grass. Vernon Bailey. (*Répertoire* [3], **15,** 217.) The occurrence of a toxic narcotic grass, *Stipa vaseyi*, is recorded, on the Sacramento mountains of California. Horses were observed to graze greedily upon the grass, known locally as "sleeping grass," which had such marked narcotic effect that they were useless for 8 or 10 days afterwards,

remaining asleep and refusing both food and drink. The grass is said to be well known by animals indigenous to the district where it grows, who never touch it. A chemical examination of the plant would seem to be of interest.

Strychnine, Action of Bromine and Iodine on. L. Martin. (*Bull. Soc. Chim.*, **31**, 386.) *Monobromostrychnine*, $C_{21}H_{21}BrN_2O_2$, is obtained as follows: Strychnine is dissolved in hydrobromic acid 50 per cent., and water, heating to 80°C. and completing solution by the addition of hot dilute sodium acetate solution. The mixture is then brominated by the gradual addition in 5 c.c. at a time of a reagent composed of bromine, 1; HBr (50 per cent.), 3. When the yellow precipitate at first formed ceases to redissolve, the solution is cooled, treated with an excess of dilute ammonia; the precipitate thus obtained is dissolved in hot 60 per cent. alcohol; the boiling alcoholic solution is diluted with 6 times its volume of water; on cooling, monobromostrychnine separates in fine colourless needles; m.p. 199°C. The bromo-derivative previously obtained is stated to have the m.p. 222°C. It forms the iodomethylate $C_{21}H_{21}BrN_2O_2CH_3I$ in slightly yellow needles; m.p. 298°C. and the corresponding iodoethylate, m.p. 272°C. On further bromination it forms monobromostrychnine hydrobromate bromide, $HBr.C_{21}H_{21}Br.N_2O_2.Br$, which is of interest, since each Br atom has a different function. The additive atom may be eliminated from the molecule by acetone, $Na_2S_2O_3$, or by KI; another may be precipitated by $AgNO_3$; the third can only be liberated by completely disintegrating the molecule. It is stable in the dark, but resinifies if exposed to the light. It melts at 204°C. Another bromo compound, dibromostrychnine, $C_{21}H_{20}Br_2N_2O_2$, is obtained by crystallizing from alcohol in whitish crystals, which are coloured by light. This melts at 130–131°C., so that each introduction of Br notably lowers the m.p. of the compound. This dibromostrychnine gives iodomethyl and iodoethyl compounds corresponding to the monobromo-bodies, also a hydrobromide of dibromostrychnine bromide, $HBr.C_{21}H_{20}Br_2N_2O_2Br$, which melts at 146°C.

With iodine, strychnine gives three kinds of iodine compounds either as a substitute for hydrogen in the molecule or as a haloid salt, or combined in an additive form. Hydriodide of monoiodostrychnine iodide, $HI.C_{21}H_{21}IN_2O_2.I$ is formed by the action of iodic acid in the presence of H_2SO_4 on prolonged boiling

with the final addition of HBr to decompose the excess of HIO_3. It is a brown powder melting at 154°C. By the action of iodine and HI on strychnine in the presence of $NaC_2H_3O_2$ and $HC_2H_3O_2$, strychnine di-iodide, $C_{21}H_{21}N_2O_2.I_2$, is obtained as a reddish crystalline precipitate of fine ruby-red crystals. It decomposes without melting. Monoiodostrychnine, $C_{21}H_{21}IN_2O_2$, is obtained by removing 2 atoms of I from the first described hydriodide of monoiodostrychnine iodide, the additive I atom, by means of acetone, the haloid atom by ammonia. It forms a crystalline light chestnut-coloured powder which melts at 188°C.

Sucrose in Vegetables. E. Bourquelot. (*Journ. Pharm. Chim.* [6], **18,** 241.) The author has already shown that the ferment invertin may be regarded as a specific reagent for the presence of cane sugar in vegetable tissues. Further investigation has shown, however, that there are other sugars more complex than sucrose, which may be regarded as compounds of that sugar, which also give reduction sugars with invertin, but that the former gives levulose and glucose alone, thus:—

Sucrose	with	invertin	gives	levulose + glucose.
Gentianose	,,	,,	,,	levulose + glucose + glucose.
Raffinose	,,	,,	,,	levulose + glucose + galactose.
Hexotriose	,,	,,	,,	levulose + glucose + hexose.
Hexotetrose	,,	,,	,,	levulose + glucose + glucose + hexose + hexose.

From this it is evident that invertin can only be regarded as a reagent for sucrose both free and combined, and that where the optical rotation of the inverted liquid is in excess of the degree for the amount of sugar known to be present, considered as simple sucrose, the excess is due to the presence of a sugar of sucrose combined in a higher molecular compound. Applying this method, the presence of sucrose, either free or combined, has been shown to be almost universal in plants. It has been detected in the roots or bulbs of *Medicago sativa* L., *Pæonia officinalis* L., *Tamus communis* L., *Gentiana lutea* L., *Neottia nidus-avis* Rich., *Colchicum autumnale* L., *Orobanche cruenta* Bert., *Carum bulbocastanum*, Koch, *Scrophularia nodosa* L., in the fresh bark of *Betula alba*, *Fraxinus excelsior*, the fresh herb of *Pellia epiphylla*, the male catkin of *Alnus glutinosus*, the fresh pericarp of *Cocos yatay* and of *Amygdalus communis*, the dried fruits of *Phellandrium aquaticum*, *Coriandrum sativum*, *Carum carvi*

Petrosilinum sativum, and in the dried seeds of *Betula alba* L., *Fraxinus excelsior* L., *Pellia epiphylla*, *Alnus glutinosus* Gaertn., *Cocos yatay* Mart., *Amygdalus communis*, L., *Phellandrium aquaticum* L., *Coriandrum sativum* L., *Carum carvi* L., *Petrosilinum sativum* L., *Asparagus officinalis* L., *Ruscus hypoglossum* Lam., *Ruscus aculeatus* L., *Convallaria maialis* L., *Schœnocaulon officinale*, A. Gr., *Allium cepa* L., *Allium porrum* L., *Asphodelus ramosus* L. var. *luteus*, *Tamus communis* L., *Cocos yatay* Mart., *Chamærops excelsa*, Thunb., *Areca catechu* L., *Erythea edulis* S. Wats., *Astrocaryum vulg.* Mart., *Œnocarpus bacaba* Mart., *Sagus rumphii* Wild, *Phytelephas macrocarpa* R. et P., *Pæonia officinalis* L., *Myristica moschata* Thunb., *Sterculia fœtida* L., *Ricinus communis* L., *Hydnocarpus heterophylla* Blume, *Tropæolum majus* L., *Pistacia vera* L., *Ervum lens* L., *Ceratonia siliqua* L., *Trigonella fœnum græcum* L., *Gleditschia triacanthos* L., *Medicago sativa* L., *Melilotus leucantha* Koch., *Medicago lupulina* L., *Amygdalis communis* L. v. *dulcis*, *Amygdalis communis* L. v. *amara*, *Aucuba japonica* L., *Anamirta cocculus* W. et A., *Strychnos potatorum* L., *Cucurbita maxima* Duch., *Sesamum indicum* D. C. In the case of the tubercles of *Helianthus tuberosus*, *Loroglossum hircinum*, the bulbs of *Allium cepa*, the fresh tubercles of *Ficaria ranunculoides*, and the seeds of *Hibiscus abelmoschus*, the results of the polarimetric reading of the inverted liquid were so far in excess of the theoretical figures, as to suggest that probably both sucrose and a polysaccharide were simultaneously present.

Sulphurated Lime, Valuation of. R. H. French. (*Proc. Amer. Pharm. Assoc.*, **51**, 346.) The minimum test of the U.S.P. for the presence of at least 60 per cent. of CaS is thus modified, and the process made available for the approximate determination of CaS or other sulphides. The H_2S evolved from a known quantity of the sample is passed into a solution of $CuSO_4$. The CuS precipitated is collected, washed, ignited and weighed as Cu_2S. Each 1 Gm. Cu_2S is equivalent to 0·9114 CaS. Samples examined by this method were found to range in CaS content from 2·73 to 69·8 per cent. Of eight samples only three met the official requirements.

Tartaric Acid, Distinctive Test for. D. Ganassini. (*Boll. Chim. Farm.*, through *Répertoire*, **14**, 469.) Free tartaric acid may be detected by heating its solution to boiling with a

little red lead. After decanting and filtering, an equal volume of 1 : 5 solution of potassium sulphocyanide is added. In the presence of free tartaric acid the mixture blackens in a few seconds; other organic acids do not give the reaction. The presence of mineral acids must be avoided.

Terpene Compounds, Formation of, in the Chlorophyll Containing Organs of Plants. E. Charabot and A. Hébert. From observations on peppermint plants grown under control it is found that the removal of the inflorescences as they appear not only increases the amount of foliage and green parts of the plants, but that when they were distilled, they yield both a higher percentage and an absolutely larger yield of oil than a similar plot of plants, grown side by side with them, in the usual way; so that a suppression of the flowers occasioned an accumulation of terpenic bodies in the leaves.

It is evident that these terpene compounds are formed in the leaves, and transferred from them to the flowers; if the flowers be eliminated they accumulate in the leaves. Light has a marked influence on the formation of terpene bodies in the leaves; plants grown in full light are found to yield more oil than those grown in the shade.

Theobromine, Quantitative Determination of. — Katz. (*Gesellschaft. deutsch. Naturforsher u. Aertze: Kassel, Sept.*, **1903**; *Chem. Zeit.* [78], **27**, 958.) The author thus modifies previously-published methods for the determination of theobromine in cacao or chocolate. Ten Gm. of the substance is boiled with 100 c.c. of water and 10 c.c. of dilute sulphuric acid for half an hour under a reflux condenser. Eight Gm. of magnesia previously rubbed down with water is then added with sufficient water to bring the volume to 300 c.c. The mixture is again boiled for 1 hour under the reflux condenser, then filtered through a suction filter, and the residue again boiled three times in succession with three separate 100 c.c.'s of water. The bulked filtrate and washings are evaporated to about 10 c.c., treated while warm with 2 Gm. of crystalline phenol or 2·5 Gm. of colourless liquid carbolic acid, and washed with tepid water into a Katz perforator. The liquid is perforated with chloroform for 3 hours, the chloroform distilled off, the last trace of phenol removed on the water-bath by means of a hand bellows, the residual theobromine dried for 30 minutes and weighed.

Umbellularia californica, Constituents of the Essential Oil

of. F. B. Power and F. H. Lees. (*Proc. Chem. Soc.*, **20**, 88.) The Californian laurel *Umbellularia californica*, is an evergreen tree indigenous to California and Oregon, and known as "mountain laurel," "cajuput," "spice," "pepper tree." "Californian olive" and "Californian Bay tree." The leaves yield a pale yellow oil, the odour of which is at first pleasantly aromatic, but when strongly inhaled becomes extremely irritating to the mucous membrane of the nose and eyes. It has the sp. gr. at 16°C., 0·9483; $[\alpha]_D - 22°$; is completely soluble in alcohol 70 per cent. It contains 60 per cent. of a new unsaturated cyclic ketone, umbellulone, $C_{10}H_{14}O$, a colourless liquid with a somewhat mint-like odour, and having in a marked degree the peculiar pungency of the oil. It boils at 219–220°C.; has the sp. gr. 0·9581 at 15°C., and the $[\alpha]_D - 37°$. It does not react normally with semicarbazide or hydroxylamine; with the former it gives semicarbazido-dihydro-umbellulone-semicarbazone, $C_{10}H_{15}.N.NH.CO.NH_2(CH_4ON_3)$, m.p. 217°C., and with the latter hydroxylamino-dihydro-umbellulone-oxime, $C_{10}H_{15}(:NOH).NH.OH$. Besides umbellulone, the oil contains cineol, 20; eugenol methyl ester, 10; lævo-pinene, 6; eugenol, 1·7 per cent., and a little safrol, as well as a trace of formic acid, veratric acid, and a mixture of free fatty acids, with practically no esters.

Umbellulone, Some Derivatives of. F. H. Lees. (*Journ. Chem. Soc.*, **85**, 639.) As mentioned in the preceding note, umbellulone, $C_{10}H_{14}O$, behaves abnormally in its interactions with hydroxylamine and with semicarbazide, for not only does its carbonyl group undergo the usual transformation by reacting with one molecule of the respective base, but, in each case, the elements of a second molecule of the latter become attached to the molecule of the ketone. The products, therefore, represent the interaction of one molecule of umbellulone with two molecules of hydroxylamine or semicarbazide.

A behaviour of this kind in respect to the interaction of hydroxylamine or semicarbazide with certain unsaturated ketones has been previously observed, in many instances, by Harries and Tiemann, and quite recently, with regard to the action of semicarbazide, by Rupe and Schlochoff.

It has been shown by these authors that the abnormal behaviour under consideration is common to those ketones which contain an ethylenic linking in an $\alpha\beta$-position with respect to the carbonyl group.

Umbellulone combines directly, in the cold, with only two atomic proportions of bromine, forming umbellulone dibromide, $C_{10}H_{14}OBr_2$; it would therefore seem to contain only one ethylenic linking. From its formula, $C_{10}H_{14}O$, and the foregoing considerations, umbellulone would appear to be an $\alpha\beta$-unsaturated cyclic ketone, containing two closed rings.

When umbellulone dibromide is slowly heated under diminished pressure, it rapidly becomes decomposed with evolution of HBr. The product of this decomposition is an unsaturated bromo-ketone, having the formula $C_{10}H_{13}OBr$ (b.p. 140–145°C. 20 mm.); but, besides this, dibromo-dihydro-umbellulone, $C_{10}H_{14}OBr_2$ (m.p. 119–119·5°C.) is also formed, the latter being probably the result of the subsequent combination of the unsaturated bromo-ketone with the elements of hydrogen bromide.

The unsaturated bromo-ketone, $C_{10}H_{13}OBr$, on reduction with zinc dust and acetic acid, becomes converted into a saturated ketone, $C_{10}H_{16}O$ (b.p. 214–217°C.).

When dibromo-dihydro-umbellulone is reduced with zinc dust and acetic acid, it is only found possible to eliminate one bromine atom with the formation of bromo-dihydro-umbellulone, $C_{10}H_{15}OBr$ (m.p. 58–59°C.). When the latter, however, is reduced by means of sodium and alcohol, tetrahydro-umbellulol, $C_{10}H_{19}OH$, is produced (b.p. 207–208°C./760 mm.)

Both dibromo-dihydro-umbellulone and bromo-dihydro-umbellulone behave as saturated substances, since they do not decolorize a solution of bromine in chloroform, even on boiling. In view of this fact, the formation of tetrahydro-umbellulol, $C_{10}H_{20}O$, from bromo-dihydro-umbellulone, $C_{10}H_{15}OBr$, can only be explained on the assumption that one of the two closed rings present in umbellulone, dibromo-dihydro-umbellulone, and bromo-dihydro-umbellulone becomes resolved by reduction in passing to the alcohol.

Umbellulone is readily oxidized by cold permanganate, yielding a lactone, $C_9H_{12}O_2$ (b.p. 217–221°C.), together with several acids which, on account of insufficiency of material, have not yet been investigated.

Urine, Detection of Albumin in, by Means of Salicyl-Sulphonic Acid. C. Murray. (*Brit. Med. Journ.* [1], **1904**, 882.) After reviewing the various tests for the detection of albumin in urine, the author selects the salicyl-sulphonic acid reagent of MacWilliam as being the most convenient and accurate. A

few drops of a saturated aqueous solution (1 : 4) of salicyl-sulphonic acid are added to a small amount of urine (20 or 30 m) in a very small test tube. If no precipitate occur there is no proteid present ; if there be a precipitate the tube is boiled to distinguish albumin, which does not clear up on heating, but becomes coagulated and flaky, from proteoses (primary), which do clear up to reappear when the fluid cools. In the absence of precipitation on the addition of the reagent it is not necessary to boil at all, hence the test is a much shorter one than the ordinary acidulation and heat test, a matter of great importance when a large number of urines have to be examined, for example, in hospital practice.

There is no need for care as to the exact amount of the reagent used ; no danger of over-acidulation, as with nitric or acetic acids—even large excess of salicyl-sulphonic acid does not redissolve the precipitated proteid. Further, the reagent is non-caustic and exceedingly stable, while it does not stain like picric acid, etc. As regards portability it can be used in the form of crystals. When using the crystals, one should proceed as follows : Half a drachm, or less, of urine is taken in a small test tube—for example, $\frac{3}{16}$ in. diameter, and 3 in. in length – a few crystals of salicyl-sulphonic acid are dropped in, and boiling, if necessary, can easily be done in the absence of a spirit lamp, etc.—over an ordinary lamp or candle.

No substance in the urine, apart from those of the proteid class, has been found to give the reaction, which is an exceedingly delicate one. As a precipitant of proteose it is greatly superior to nitric and acetic acids, as the latter redissolve the precipitate when too much acid is added.

Urine, Detection of Acetone in. — Vournasos. (*Bull. Soc. Chim.*, **31,** 137.) Acetone may be detected in urine by means of a solution of iodine in aniline or methylamine, in an alkaline solution, since it forms iodoform, which yields an isonitrile, recognizable by its odour. The reagent with aniline is prepared by dissolving 1 part of powdered iodine in 10 parts of pure aniline by the aid of a gentle heat, then filtering. 10 c.c. of the urine is rendered alkaline by the addition of 1 c.c. of 10 per cent. NaOH solution, filtered, treated with 1 c.c. of the aniline reagent and boiled. The characteristic odour of isonitrile will be evident in the presence of acetone. The methylamine reagent, which answers the same purpose, is made by dissolving

potassium iodide, 0·5 Gm., in distilled water, 50 Gm., and iodine, 1 Gm., in the solution. After filtration methylamine, 5 Gm., is added. The test is applied as before, when the odour of methylcarbylamine will be developed in the presence of acetone. Since pure methylamine is not so easily procurable the aniline reagent is most suitable for general purposes, and is equally sensitive.

Urine, Detection of Sugar in, by Means of Phenylhydrazine Oxalate. E. Riegler. (*Pharm. Post*, **37**, 310.) Phenylhydrazine oxalate forms a delicate and convenient reagent for the detection of sugar in urine, and being in a crystalline form is readily portable, and serves well for clinical use. 1 c.c. of the urine is boiled in a test tube with 10 c.c. of water. A few grains of phenylhydrazine oxalate are dropped in, and, when dissolved, 10 c.c. of 10 per cent. KOH solution is added. The tube is then closed with a rubber stopper, and well shaken. In less than a minute, if glucose be present, a fine red-violet colour reaction is obtained. The development of a colour on standing is not indicative of the presence of sugar. The reaction will detect 0·05 per cent. of glucose.

Urine, Detection of Urobilin in. L. Grimbert. (*Journ. Pharm. Chim.* [6], **19**, 425.) The methods of Denigès and of Roman and Delluc are combined and modified as follows: Yellow HgO, 5 Gm., is dissolved in a mixture of H_2SO_4, 20 Gm., and water, 100 c.c. Zinc acetate, 10 Gm., is dissolved in alcohol 95 per cent., with the addition of a few drops of $HC_2H_3O_2$ to produce a clear liquid. 30 c.c. of the urine is treated with 20 c.c. of the $HgSO_4$ reagent and filtered after standing for 5 minutes. The filtrate is transferred to a separator and shaken with $CHCl_3$, 5 c.c. The $CHCl_3$ generally separates readily. It is withdrawn and filtered through a small dry filter-paper into a test tube. The $Zn2C_2H_3O_2$ reagent is then added drop by drop as long as a cloudiness is produced, about 10 drops being required. When the liquid clears, a characteristic green fluorescence is obtained in the presence of urobilin. By this method traces of that body may be detected in urine charged with indoxyl and with biliary pigments.

Urine, Determination of Salicylic Acid in. (*Pharm. Centr.*, **45**, 400.) From 30 to 50 c.c. of the urine to be tested is acidified with 1 c.c. of dilute H_2SO_4 and shaken out for 3 to 5 minutes with

50–80 c.c. of ether. One half of the ethereal layer is then shaken with 2 per cent Fe_2Cl_6 solution until no further colour reaction takes place. It is then transferred to a Nessler glass, and the colour matched in a similar glass with 2 per cent. Fe_2Cl_6 solution, and a known volume of 1 per cent. salicylic acid solution added from a burette. The result may be expressed in Mgm. of salicylic acid.

Ursone, Distinction of, from Cholesterol. E. Hirschsohn. (*Pharm. Centr.*, **44**, 613.) It has been stated that ursone, obtained by Trommsdorff from bearberry leaves, gives reactions identical with those of cholesterol. The author finds that they are readily distinguished. A mixture of ursone and cholesterol may be separated by means of petroleum ether, in which cholesterol is readily soluble, ursone almost insoluble. If 1 Mgm. of ursone be dissolved in 10 drops of liquid trichloracetic acid (water, 1; trichloracetic acid, 9) only a faint yellow colour is obtained in 48 hours. Under the same conditions cholesterol gives a bright violet colour, gradually assuming a reddish tinge. Ursone only gives this violet colour if the solution be warmed. When treated with trichloracetic acid containing 10 per cent. of HCl, the above reactions are rapidly developed by cholesterol, but ursone gives only a greenish tint in 48 hours at normal temperatures, no blue or violet colour being developed until the mixture is warmed.

Water, A Reaction for Nitrites and for Zinc in. W. A. Blunt. (*Analyst*, **28**, 313.) A sample of water which absorbed an unusual amount of oxygen in the course of the ordinary permanganate process was suspected to contain iron, and tested in the usual way with ferrocyanide. Instead of the familiar blue colour developed by persalts of iron, or the cloudiness produced by the smallest trace of zinc, a urine-yellow tint immediately appeared, which was found on investigation to be due to the presence of nitrites, which converted the ferrocyanide to ferricyanide by oxidation in the well-known manner. This reaction appears to furnish a delicate qualitative test for nitrites, having the advantage that in one operation it is possible to test a sample of water for nitrites, zinc and iron. It might even be feasible to elaborate a process for the quantitative estimation of nitrites on the above lines, making use of the comparative depths of tint in columns of solution. In connexion with the use of ferrocyanide as a test, attention is drawn to its increased

delicacy for zinc when employed in a solution slightly acidified with hydrochloric acid instead of a neutral one.

Water, Detection and Determination of Nitrites in. J. Desfourniaux. (*Annales de Chim. Analyt.*, **9,** 68.) About 10 c.c. of the filtered water is mixed in a test tube with a few drops of 10 per cent. KI solution, and a little starch reagent. A 5 c.c. solution of salicylic acid, 5 Gm., in alcohol 90 per cent., 80 c.c., is then carefully run down the sides of the tube from a pipette in such a manner as not to cause the two liquids to mix. If only traces of nitrites be present a violet ring of starch iodide will appear at the zone of contact.

The quantitative method is based on the same reaction :—

$$2C_6H_4\begin{matrix}OH\\COOH\end{matrix} + N_2O_3 + 4HI = 2C_6H_4\begin{matrix}OH\\COOH\\I\end{matrix} + 3H_2O + N_2 + I_2$$

It will thus be seen that each molecule of HNO_2 is equivalent to an atom of iodine. A known volume of the water is warmed with salicylic acid and potassium iodide. The liberated iodine is then titrated in the usual manner with hyposulphite solution.

Water Free from Ammonia, Preparation of. J. B. Weems, C. E. Gray and E. C. Myers. (*Journ. State Med.*, **9,** 630, after *Proc. Iowa Acad. Sci.*) About 4 Gm. of sodium peroxide is added to each litre of distilled water, which is then boiled for 30 minutes, or longer. It will then be free from ammonia. Water may also be obtained free from ammonia and from nitrogen by treating it as above, and distilling from a copper retort, rejecting the first portion of the distillate.

Xanthoxylins. H. M. Gordin. (*Proc. Amer. Pharm. Assoc.*, **51,** 215.) Stenhouse first isolated a crystalline body from Japanese pepper, *Xanthoxylum piperitum*, which was shown to be isomeric with cantharidin. Subsequently E. Staples found another crystalline body in the Northern prickly ash *X. fraxineum*, to which the name xanthoxylin was also applied Another crystalline body, differing from the second named, was found by G. H. Colton in the Southern prickly ash, *X. carolinianum*.

To avoid confusion the author retains the name xanthoxylin for Stenhouse's original body, and names the crystalline principle

of *X. fraxineum* xanthoxylin N., and that from *X. carolinianum* xanthoxylin S.

Xanthoxylin N. was found to be readily soluble in cold alkaline alcohol, from which it is precipitated by passage of CO_2. Taking advantage of this fact, the oily benzol extract of *X. fraxineum* bark was treated with KOH, 20 Gm., alcohol, 70 c.c., and water, 20 c.c., for every 100 Gm. of oil; warmed and diluted with water, filtered, and CO_2 passed through the solution until the mixture became thick, and the colour changed from green to yellow. The xanthoxylin N. thus precipitated was at first amorphous, but became crystalline on standing. When purified by recrystallization from alcohol it had the m.p. 131–132° C., and gave analytical figures corresponding to the formula $C_{15}H_{14}O_4$. It contains one methoxyl group. Although its behaviour towards alkali seems to indicate a phenolic character, no indication of a HO group could be obtained, nor of an aldehyde or carbonyl group.

Xanthoxylin S. is not soluble in alcoholic potash. It was isolated from the oily benzol extract by treating it with two volumes of petroleum ether; on standing, a crystalline deposit formed; this was collected, taken up with cold ether, the solvent distilled off and the residue recrystallized from hot alcohol. The snow-white crystals thus obtained had the m.p. 119–120° C. Its formula was found to be $C_{14}H_{12}O_4$, or $C_{21}H_{18}O_6$. It contained no methoxyl group. Its precise formula has not yet been established.

Yangonin, A Crystalline Body from Piper methysticum. J. D. Riedel. (*Riedel's Report*, **1904,** through *Pharm. Centr.*, **45,** 71.) Two crystalline principles have been isolated from kava-kava, methisticin or kavahin and yangonin.

Methisticin or kavahin has been shown by Pomeranz to be a piperinyl acetic methyl ester,

$$CH_2\langle\begin{matrix}O\\O\end{matrix}\rangle C_6H_3.CH:CH.CH:CH.CO.CH_2.COOCH_3;$$ Notting

and Kopp attributed to it the empirical formula $C_{17}H_{17}O_5$.

Yangonin has not received much attention; the author has separated it from methisticin by treating the finely powdered crystalline mixture of the two bodies with an equal weight of 90 per cent. alcohol, and leaving them in contact with a 20 or 10 per cent. solution of KOH in alcohol 90 per cent. at

normal temperatures for 20 hours. After distilling off the greater part of the alcohol, and freely diluting the residue with water, yangonin remains insoluble, while the methistinic acid is dissolved in the alkaline solution. After recrystallizing from acetic acid and treatment with animal charcoal, yangonin is obtained pure. It melts at 156°C., and has the formula $C_{10}H_8O_3$. It dissolves in strong H_2SO_4 with a yellow colour and a greenish fluorescence.

Yeast Extract, Detection of. A. Searl. (*Pharm. Journ.* [4], **17,** 516, 704.) The following simple test will enable the analyst to detect adulteration of meat extract with yeast extract. Make a modified Fehling's solution by dissolving 200 grains sulphate copper and 250 grains neutral sodium tartrate in 4 oz. water; add to this 250 grains caustic soda dissolved in 4 oz. water. Dissolve 10 grains of the sample to be examined in $1\frac{1}{2}$ oz. water, and add to it half volume of the above solution, and boil for a minute or two.

With genuine meat extract no precipitation occurs, but with yeast extract a bulky, curdled precipitate of a bluish-white colour is thrown out, which is almost insoluble in water. When collected, washed, dried and weighed, several samples of yeast extract have been found to give approximately 1 grain of this precipitate (it looks to the eye more like 20 grains) from 10 grains extract. It naturally varies a little, according to the amount of moisture and ash contained in the sample. Only one sample of yeast extract has yet been found which did not respond to this test, and in that case it readily reduced the copper.

Since yeast extract can be manufactured at a nominal cost from brewers' and distillers' waste products, and its physical characters closely resemble meat extract, it forms an excellent material for fraudulent admixture, for which, until now, no simple chemical test has been available.

In a subsequent note the author gives the following modification of the above process, by which it is stated that the admixture of as little as 1 per cent. of yeast extract with flesh extract may be detected:—

If the sample give doubtful or negative results by the above test, but is still open to suspicion, take from 50 to 100 grains and dissolve in 1 or 2 drachms water (according to quantity taken); add to this sufficient spirit (methylated will answer the purpose) to throw down all that is insoluble in alcohol. After vigorous

shaking, separate the insoluble residue by decanting or filtering; dissolve this residue in $1\frac{1}{2}$ oz. water, filter if necessary, and proceed as before. If yeast extract is present the characteristic bluish-white precipitate will be thrown down on boiling with the modified Fehling's solution, and may be collected and weighed.

Yohimbine, Colour Reactions of. G. Mellière. (*Journ. Pharm. Chim.*, **18,** 385.) Yohimbine gives, with cane sugar and sulphuric acid, a vinous red colour, similar to that given with biliary acids. A few crystals of the alkaloid are dissolved in 50 per cent. H_2SO_4, and the solution warmed on the water-bath in a small porcelain capsule, after adding a few grains of sugar until the wine-red colour is developed. The red liquid shows, on spectroscopic examination, a large absorption band in the blue.

When yohimbine is treated with excess of HNO_3 and evaporated on the water-bath, a bright yellow residue is obtained, which turns burnt-sienna brown on moistening with ammonia.

Yohimbine, Further Notes on. L. Spiegel. (*Berichte,* **37,** 1759.) Crystalline yohimbine under definite conditions loses 1 mol. H_2O, and is converted into anhydroyohimbine, $C_{22}H_{28}O_3N_2$; m.p., 234-234·5°C. This base, under certain conditions, is reconverted into yohimbine in the formation of salts. Anhydroyohimbine hydrochloride, $C_{22}H_{28}O_3N_2.HCl$, is obtained by the action of HCl and methyl alcohol on yohimboasic acid. The nitrate, $C_{22}H_{28}O_3N_2.HNO_3$, occurs in colourless prisms, m.p. 276°C. The author abandons his name, nor-yohimbine, for the product of the action of alkali on the base, and adopts that of Wurzheim, yohimboasic acid. This has the formula $C_{20}H_{26}O_4N_2$ and is a monobasic acid as well as a monoacid base. It forms the silver salt, $C_{20}H_{25}O_4N_2Ag$. A series of esters of this acid have been formed; the ethyl ester, $C_{24}H_{32}O_3N$, in needles, m.p., 189°C.; propyl ester, $C_{26}H_{36}O_3H_2$, m.p., 135–6°C., and others.

MATERIA MEDICA.

PART II.

MATERIA MEDICA.

Acetone Chloroform (Chloretone). (*Merck's Report*, **17,** 1.) L. Wheeler and W. L. Fawcitt both record favourable results in the treatment of sea-sickness with chloretone. The initial dose given was 10 grs., followed by repeated doses, at 4 hours' interval, of 5 grs.

Acetozone (Benzozone). (*Merck's Report*, **17,** 2.) Acetozone is chemically the peroxide of benzoyl-acetyl; it is a crystalline compound fusing at 29-30°C., and dissolving in water to the extent of 1 : 1,000. According to the communications of Freer and Novy, acetozone has extraordinarily powerful bactericidal properties which have been practically and successfully utilized by F. Wasdin, I. A. Abt and E. Lackner, as well as F. G. Harris, in the treatment of typhoid. The preparation is appropriately given in the form of its 1 per mille aqueous solution, which together with milk should, during the period of fever, constitute the sole nourishment partaken of by the patient. Children take the solution more readily when mixed with a little orange juice. The usual dose of the aqueous solution is 4 6 fl. ozs. taken at intervals of 4 hours. A. G. Dellenbaugh records a case of septicæmia where recovery resulted from the intravenous injection of 1 per mille solution of acetozone. I. M. Brown has employed this solution for local spraying in atrophic rhinitis and records decidedly favourable results.

Flavel Woods and M. C. Thrush (*Therap. Gaz.* [3], **19,** 373) publish a report on fifty-three cases of typhoid, all of which were cured in the Presbyterian Hospital of Philadelphia by treatment with acetozone. It acts as a valuable intestinal antiseptic, lessening the tendency to tympanites and diarrhœa,

especially when administered in the early stages of the fever. The stools are rendered less offensive. It does not act on the heart or respiratory organs, while the kidneys are not appreciably affected. Hyperexia but rarely appears when acetozone is employed, and relapses are infrequent when its administration is continued until convalescence is fully established.

Acetyl Chloride as a Digestive Stimulant. G. D. Spineanu. (*Annales de Pharm.*, **9,** 297.) According to the author, acetyl chloride, forming on contact with water nascent HCl and CH_3OOH, acts as a powerful digestive stimulant when administered internally, and is of special service in cases of dyspepsia due to deficiency of HCl.

Adrenaline in Pulmonary Hæmoptysis. A. S. Hedley (*Brit. Med. Journ.* [1], **1904,** 365) confirms the statement of Bird and others as to the value of adrenaline, given internally, in arresting severe pulmonary hæmorrhage, citing two severe cases in which the remedy was given in doses of a teaspoonful of a 1 : 5,000 solution, with the result that the bleeding was arrested. In one of these cases most of the recognized remedies had been fruitlessly employed before the use of the adrenaline solution. The author has also found the remedy of value in the treatment of *post-partum* hæmorrhage.

Adrenaline to Counteract Cocaine Toxicity. — Foisy, (*Répertoire* [3], **16,** 23.) It is found that the addition of 1 drop of a 1 : 1,000 solution of adrenaline to each c.c. of a 1 : 200 solution of cocaine hydrochloride completely counteracts the toxic symptoms, such as pallor, excitement, sweats, and even delirium, which sometimes follow the use of the same injection without adrenaline, when employed to produce local anæsthesia. The author has employed the cocaine-adrenaline mixture on 149 patients without experiencing a single instance of any toxic symptom. Further, he shows that with animals from 9 to 15 times a toxic dose of cocaine, when injected, accompanied by adrenaline, in the form of the above solution, may be administered without producing either convulsions or muscular contractions.

Adrenaline Hydrochloride in Hæmorrhage of Typhoid. — Graeser. (*Muench. Med. Woch.*, through *B.M.J. Epit.* [2], **1903,** 75.) Thirty drops of adrenaline hydrochloride solution, administered in a saline draught every 3 hours, has enabled the author to arrest severe hæmorrhage in typhoid fever, where

other remedies had failed. In the case cited, a recovery was effected although the patient was almost pulseless when the adrenaline treatment was commenced. No ill effects resulted from its employment.

Aesco-Quinine. (*Merck's Report*, **17**, 13.) Aesco-quinine is a compound of quinine and glucosidal substances contained in the seeds of the horse-chestnut. It is an amorphous yellow powder with a bitter taste. It is almost insoluble in water but freely soluble in alcohol.

The preparation is used in neuralgia, migraine, rheumatism, influenza and in ropy secretion of the respiratory organs. Owing to its bitter taste it is administered in wafers or tablets in doses varying from 1½ 3 grs. taken several times daily.

Alkaloidal Drugs, Improved General Method for the Assay of. A. B. Lyons. (*Pharm. Review*, **21**, 428.) The author advocates the following percolation method for the extraction of alkaloids from drugs, as avoiding undue loss by transference from one vessel to another as in the original Keller and other processes: A cylindrical percolator about 20 cm. long and 2 2 5 cm. in internal diameter is employed, ending in a tube 5 cm. long, and 3 mm. internal diameter. A glass stopcock in this tube is an advantage. A known weight of the drug is moistened with a mixture of ammonia, alcohol and ether-chloroform in the proportions best suited to extract the substance to be assayed. For 10 Gm. of such a substance as belladonna leaves the mixture may consist of strong solution of ammonia, 1 c.c.; alcohol, 4 c.c.; ether chloroform (6 : 1 vol.), 5 c.c. Moisten in a small evaporating dish, quickly transfer to the percolator packing firmly with a glass rod. The small amount of powder adhering to the dish and rod can be easily removed with a pad of absorbent cotton, which is firmly packed on the top of the powder. The moist drug is allowed to stand for 10 minutes, then a mixture of ether-chloroform or any desired menstruum is passed through, the rate of flow being regulated to 1 drop per second, which will generally ensure complete exhaustion when 50–60 c.c. of percolate has passed. The removal of all alkaloid is assured by collecting 10 or 15 drops of the percolate, stirring with a drop of acid, evaporating off the solvent and testing the residue with Mayer's or Wagner's reagent. The alkaloidal assay is then conducted with the percolate in the usual manner.

Alphozone. (*Pharm. Centr.*, **45,** 262.) Under this name disuccinyl peroxide [$(COOH.CH_2CH_2CO)O_2$] has been introduced as an antiseptic and germicide for external and internal use. It is odourless, non-poisonous, and freely soluble in water; it does not coagulate albumin. A 1 : 5,000 solution kills the typhoid bacillus in 1 minute.

Alsol in Eye Diseases. L. Pick. (*Therap. Monats.*, **17,** 349.) Eighteen months' experience with alsol, aluminium acetotartrate, shows that it is an excellent astringent antiseptic in various eye diseases. It is generally prescribed thus: Alsol, 5 per cent. solution, 6 oz. One teaspoonful in a cupful of recently-boiled water to be used to bathe the eye as directed. These directions generally are to bathe or wash the affected eye for from 10 minutes to half an hour, morning and evening, or several times a day. The affections successfully treated included blennorrhœa neonatorum, acute and chronic conjunctival catarrh and granular eyelids, chronic trachoma and scrophulous affections of the eyes. In some cases, such as corneal ulcer, compresses of very weak, 1 : 500 or 1 : 1,000, solutions have given good results.

Aquilaria agallocha (Eagle, or Aloe Wood. Lignum-aloes Wood). D. Hooper. (*Agricult. Ledger*, **1904,** 1.) The name of the wood is Lignum aloes, Pao Daguila-aloes wood, from the Malayalam word agil, Kulambak, aguila wood (*Linschoten*), Calamba, Aggar, Tugge, Agallochum Xylo or Paradise wood. The meaning of the Chinese name is "fragrancy sinking under water," and alludes to the heaviness of the wood. The same character of the wood is indicated in the Sanskrit name *garu* = heavy.

The word aloes probably comes from *lauha*, a Sanskrit or Pali word. Others suppose the name to be a corruption of the Arabic term Al-úd.

The tree grows in Cachar, Sylhet, Darrang, Jorhat, Sibsagar, Manipur, in Assam. As a tree of Bengal, it occurs in Tipperah. In Burma it is found in considerable quantities in Tenasserim, and on the islands of the Mergui Archipelago. It attains a height of 60 or 70 to 100 feet, and a girth of 5 to 8 feet. The tree is fit to be cut down for agar collecting at 20 years, but others consider it is not mature enough until it is 50 or 60 years old. The flowers appear in March and April, and the fruit ripens in July and August.

The wood of *Aquilaria agallocha* in its ordinary state is not of much value, being pale in colour, light and inodorous. But under certain conditions a change takes place in both trunk and branches, the wood becoming gorged with a dark resinous, aromatic juice, and acquiring a greater specific gravity. These portions of the wood are collected and constitute the drug called *agar*, which is esteemed the more in proportion as it is ponderous and abounds in resinous matter.

Were the wood less soft than it is, the labour of procuring this substance would probably exceed its worth, since, there being no external diagnosis, each tree has to be cut down to discover the resin. Sometimes the resinous deposit is found in one out of every dozen trees, and only one in a hundred will yield a rich wood. If the resin should exist the vein will most likely be found cropping up at a point 8 or 10 feet below the lower bough, on the other side of the bend, if there be any; from here it is followed down as far as it exists or as it is considered necessary. The average yield of a mature tree is 3–4 seers.

Occasionally, but very rarely, a tree is met with that contains as much as ₹300 worth of *agar*; in this case the entire substance of the tree, from almost immediately under the bark, becomes converted into *agar* for a considerable way up, so that a single blow of the axe lays it open.

It is a difficult matter to decide what is the predisposing cause of the secretion of this peculiar oleo-resin. It is not old age, as it is frequently found in young trees, and though it becomes concentrated in old trees the secretion makes its appearance at an early age. No fluid resin exudes from the trees naturally, and in Jorhát several trees were specially tapped but no drop of secretion made its appearance.

The drug occurs in irregular pieces, the largest of which rarely exceeds 1 lb. in weight. The larger pieces are scooped and trimmed with care, but some of excellent quality is met with in splinters or chips. The wood has a bitter aromatic taste, and the odour is peculiar, being compared by some to ambergris, by others to sandal wood. It burns with an aromatic smoke.

The balance of opinion among forest officers is that the *agar* is usually, if not always, found where some former injury has been received.

Brownlow also states that in the male trees only, or, as the natives call them, *mooneas*, the resinous substance is to be found,

and it is vain to look for it in the fruit-bearing or female trees of the same species.

A heavy, dark coloured, straight grained, oily and resinous wood, the botanical origin of which is unknown, is imported into Bombay and Calcutta from Zanzibar as a substitute for true aloe wood. It is called Sagar-Tagar, Tuggur or Taggar wood, and is frequently offered as a substitute for the agar of Assam. Like *agar*, it sinks in water, but is recognized by giving a yellow colour to the water which develops a greenish fluorescence. This wood is sent to Delhi, Lucknow and other large cities of Northern India, where it is distilled with other ingredients to form some of the compound attars so much esteemed by the natives.

From ancient times *agar* has been used all over the East for its perfume and its supposed medicinal qualities. On account of its portability and great value, one of the petty Rajahs of Assam used to send his tribute to the Viceroy, during the Muhammadan rule, in this substance. At one time it was sold by weight against silver and gold. In the present day aloe wood is used largely in China, where it is consumed as incense and in the manufacture of joss-sticks. It is, however, to be met with in Eastern bazaars, including those in Syria, where Hanbury found it for sale. In Sylhet a certain quantity is collected each year for the sake of extracting from it an essential oil (*agar-attar*) which is regarded as costly as otto of roses.

Although the wood enjoys in the East a reputation as a stimulant tonic, it does not probably possess any true medicinal value.

The bark of the tree affords a natural paper which has been used for ages by the aboriginal tribes of Assam, like the birch bark of the Aryans.

Arheol. (*Merck's Report*, **17,** 30.) Arheol, $C_{15}H_{26}O$, is an alcohol obtained from sandalwood-oil. It was first prepared by Riehl in 1898. Riehl also investigated its therapeutic value in the treatment of urethritis and found it to be quit equivalent to sandalwood oil, without however exhibiting its undesirable features. The conclusions of Riehl have been confirmed by the investigations and successes of Ravasini, who employed it in gonorrhœa and its sequelæ. Arheol is administered in capsules of 3 grs., 6-12 of which should be taken in the course of the day. Arheol has also yielded good results in cystitis.

Arhovin. (*Pharm. Zeit.*, **48,** 1012.) This is an additive

compound of diphenylamine and thymylbenzoic ethyl ester having the formula

$$C_6H_4 \begin{cases} C_{10}H_{13} \\ COO.C_2H_5 \\ (C_6H_5)_2NH. \end{cases}$$

It forms a heavy, oily fluid, sp. gr. 1·055, with a burning, cooling taste, and an aromatic odour; it is therefore administered in capsules each containing 4 grs. It is given in the treatment of gonorrhœa, the urine, under its influence, containing phenyl hippurate.

Atropine Methyl Bromide. (*Merck's Report*, **17,** 35.) Extended use of atropine methyl bromide indicates that it is capable of wide application as a sedative. Aronheim considers it to be an important substitute for morphine. Internally in doses of $\frac{1}{64}$ to $\frac{1}{32}$ gr. it is an efficient remedy for headache, migraine, rheumatic pains, and almost all painful affections. In bronchitis and spasmodic cough it also acts as a sedative.

Aronheim finds that atropine methyl bromide in the form of a 0·02 per cent. solution is an excellent anæsthetic substitute for cocaine in small operations on the cornea, such as the removal of foreign bodies, where the slight dilation of the pupil to which the application gives rise does not cause the least inconvenience. The results are equally satisfactory in circumscribed inflammations of the cornea. In ophthalmic surgery he employs as well a solution and ointment of the following composition: Atropinæ mythylbromidi, $\frac{1}{20}$ gr.; aq dest., 150 gr. And, atropinæ methylbromidi, $\frac{1}{6}$ gr.; hydrarg. oxyd. flav., 3 gr.; lanolini, 150 grs.

By subcutaneous injection of $\frac{1}{600}$ to $\frac{1}{200}$ gr. an immediate subsidence of the pain follows in painful affections of the abdomen, acute crupous inflammation of the lungs, gastralgia, periodontitis and hepatic colic. Unpleasant sequelæ, such as sometimes arise from the administration of morphine, nausea and vomiting, have never been observed with atropine methyl bromide.

Beeswax, Portuguese. H. Maustbaum. (*Zeit. Angew. Chem.*, **16,** 647.) The following are the mean results of the examination of seventeen samples of pure Portuguese beeswax. The wax is produced mainly in Angola and other Portuguese colonies, and is imported into Lisbon: Sp. gr., 100°C./15°, 0·8152;

m.p., 64·5°C.; solidifying point, 62·8; acid value, 18·35; ester value, 72·85; saponification value, 91·28; ratio, 3·96; Huebl value, 10·1; Buchner value, 2·05.

Beilschmiedea Bark, So-called. E. S. Hooper. (*Pharm. Journ.* [4], **18,** 361.) This bark was sent over by the late Dr. Dymock to E. M. Holmes. It was stated to be the bark of *Beilschmiedea fagifolia*, var. *dalzelii* (Lauraceæ), and was said by the native doctors to be a tonic febrifuge, antispasmodic, and expectorant in asthmatic cough. The bark occurs in simple quilled pieces, about 8 ins. long and $\frac{1}{8}$ in. thick. It is light brown in colour and shows numerous transverse lenticels, from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. long. Internally it is lighter in colour and quite smooth. The fracture is short, and the cut surface, examined with a lens, shows wavy medullary rays, extending about half way across the surface.

The powder of the bark is strongly sternutatory, and when mixed with water produces much frothing.

From the histological characters of the bark, which are described in detail, with illustrations, and the chemical constituents, it is concluded that the bark is not of lauraceous origin, and is not derived from a *Beilschmiedeæ*. It yielded only a trace of a solid aromatic body on distillation with steam. No evidence of the presence of an alkaloid was obtained. It contained a saponin.

Biogen and Dermogen. M. Frenkel. (*Amer. Drugg.*, **41,** 269.) At the International Congress of Applied Chemistry the author discussed the value of magnesium peroxide and zinc peroxide, to which the names biogen and dermogen were respectively given. These compounds have been previously (*Year-Book*, **1903,** 211, 217), known as hopogan and ektogan respectively. Frenkel has taken biogen, containing 25 per cent. of pure MgO_2, in doses of 6 7 grs. repeated thrice daily, for a fortnight, without experiencing any inconvenience. This is considered to be an average dose, although more may be administered without harm. Under the influence of the hydrochloric acid of the gastric juice biogen liberates hydrogen peroxide, as shown by the equation

$$MgO_2 + 2HCl = MgCl_2 + H_2O_2$$

Birch Leaf, Decoction for Renal Calculi. — Jaenicke. (*Pharm. Centr.*, **45,** 465, after *Centr. für inn. Med.*) A

decoction of birch leaves, obtained by boiling a heaped teaspoonful of the leaves in 250 c.c. of water for 5 to 10 minutes, is found to be an efficient disintegrant of renal calculi and a diuretic, when taken in doses of 2 cupfuls a day. At first particles of calculus the size of a pea were passed; later it was discharged in the form of coarse sand.

Bismone, Colloidal Bismuth Oxide. (*Apoth. Zeit.*, **18,** 841.) Bismone is obtained by the action of sodium protalbinate or lysalbinate on bismuth salts. The solution thus obtained is purified by dialysis, then evaporated to dryness *in vacuo*. It is redissolved in water at 50–60°C., by keeping for some time at this temperature on the water-bath. The solution thus obtained may be sterilized by boiling. Bismone is hydrated oxide of bismuth in a colloidal condition, containing 20 per cent. of bismuth. Its 25 per cent. solution is of a yellowish red colour with a faint opalescence; it is tasteless; the 50 per cent. solution is syrupy. The solutions do not keep, throwing down a black precipitate after 3 or 4 weeks. Bismone may be given in large doses internally without any inconvenience, but is not suitable for intravenous injection, forming nodosites at the point of injection and causing fatal nephritis or peritonitis. It is of service in cases of acute or chronic inflammation of the digestive organs, and in the treatment of infantile dyspepsia. In the latter a teaspoonful of a 1 per cent. solution should be given 3 or 4 times a day.

Bismuth Agaricates. (*Merck's Report.* **17,** 16.) *Neutral bismuth agaricate*, $(C_{16}H_{28}O_5)_3Bi_2$, is a colourless, tasteless powder, almost insoluble in water. Like basic bismuth agaricinate, it has been introduced as a remedy for intestinal catarrh and night-sweats. According to H. Schneider its administration during several days in doses of 4–15 grs. produced in several cases a favourable effect upon diarrhœa, whereas it failed to exercise any influence upon tuberculous processes. No secondary effects have as yet been observed.

Bismuth basic agaricate, $C_{16}H_{30}O_8Bi_2$, is a colourless powder, almost insoluble in water, which resists the action of acids almost as effectively as the neutral salt. It resembles the neutral salt in its therapeutic action.

Bornyval. (*Pharm. Zeit.*, **48,** 772.) Under this name, borneol iso-valerianic ester has been introduced into medicine to replace

valerian preparations. It has a slight but not unpleasant taste of valerian; the sp. gr. is 0·921 at 20°C.; $[a]_D + 27° 40'$. It is given in a capsule containing 4 grs. twice daily.

Bromoquinol. (*Merck's Report*, **17,** 43.) Bromoquinol, or quinine dibromo-salicylate, consists of yellowish crystals melting at 197–198°C. It is sparingly soluble in water, alcohol or ether.

Von Noorden has administered bromoquinol in doses of 9–12 grs. twice daily, and has found it to exercise a beneficial influence in typhoid, streptococcic septicæmia, and inflammation of the lungs. It was likewise given as a soporific.

Canada and Oregon Balsams. E. Dowzard. (*Chem. and Drugg.*, **64,** 439.) Canada balsam gives a turbid solution with 5 volumes of 90 per cent. alcohol, and does not yield a clear solution even with absolute alcohol.

Oregon balsam appears to be made by dissolving colophony in turpentine, and as it is being used as an adulterant of Canada balsam, experiments were made to find if there are any analytical data by which it can be distinguished from and detected in Canada balsam. Oregon balsam is soluble in all proportions of 90 per cent. alcohol; this alone is sufficient to distinguish it from Canada balsam, but is of no use as a test for a mixture of the two oleo-resins; it also possesses a slightly different odour, which, however, cannot be relied on in cases of mixtures wherein Canada predominates. There is very little difference between the general appearance of the balsams. The sp. gr., optical rotation, and refractive index were determined, but did not yield results of much value. The following figures were obtained:—

—	Sp. Gr. 15·5°C.	Rotation 100 mm.	Refractive Index 20°C.
Oregon balsam . . .	0·993	−3° 12′	1·5123
Canada balsam, No. 1 .	0·988	+2° 0′	1·5205
,, ,, No. 2 .	0·993	+3° 30′	1·5186
,, ,, No. 3 .	0·989	+1° 20′	1·5200

The sp. gr. is about the same in both, but it will be noticed that all the samples of Canada balsam are dextro-rotatory, while the Oregon balsam is lævo-rotatory. The refractive index of Oregon balsam is distinctly lower than that of Canada balsam.

The essential oil was separated by steam-distillation and examined, with the following results:—

	Essential Oil from			
	Oregon Balsam.	Canada Balsam.		
		No. 1.	No. 2.	No. 3.
Sp. gr. 15·5°C. . . .	0·8652	0·8625	0·8648	0·8625
Rotation 100 mm. . .	− 37° 24′	−28° 56′	−27° 36′	− 26° 4′
Refractive index 20°C. .	1·4670	1·4765	1·4730	1·4760
Ester, calculated as bornyl acetate	0·8%	0·4%	0·6%	0·5%

The sp. grs. of the essential oils are practically the same. A greater difference will be noticed in the optical rotation, but this is not of much consequence, as a mixture of different turpentines could be made having the correct rotation. The refractive index of Oregon balsam oil is lower, and the ester-content higher, than that of Canada balsam oil.

The resin-content of the different samples is practically the same in all cases, viz. Oregon balsam, 70·6 per cent.; Canada balsam (No. 1), 68·3 per cent.; (No. 2), 72·8 per cent.; and (No. 3), 70·1 per cent. These figures show that Oregon balsam is made closely to match Canada balsam in this respect. The resins were examined for their acid values, which were found to be: Oregon balsam resin, 153; Canada balsam resin (No. 1), 123; (No. 2), 122; and (No. 3), 120. The average acid value of colophony is about 155.

The acid value of the resin is the most valuable test for the purity of Canada balsam, and is best determined as follows: First estimate the amount of resin present by driving off the oil from a weighed portion (1–2 Gm.) of the sample. Then dissolve 3 Gm. of the balsam in neutralized alcohol and titrate with N/2 KHO, using phenolphthalein as an indicator. The acid value of the resin is then easily calculated.

Dieterich found the acid value of Canada balsam to vary from 84 to 86·8. Taking the percentage of resin as 70, the acid value of the resin would vary from 120 to 124, which confirms the results obtained by the writer.

Pure Canada balsam has the following analytical characteristics:—

Canada Balsam: Sp. gr. 15·5°C., 0·987 to 0·994; optical rotation 100 mm., + 1° to + 4°; refractive index 20°C., 1·518 to 1·521; resin, 68 to 73 per cent.; acid value, 84 to 87. *Essential Oil from Canada Balsam:* Sp. gr. 15·5°C., 0·862 to 0·865; optical rotation 100 mm., − 26° to − 29°; refractive index 20°C., 1·472 to 1·477; ester, as bornyl acetate, 0·4 to 0·6 per cent. *Resin from Canada Balsam:* Acid value, 120 to 124.

Cativo Balsam. — Weigel. (*Pharm. Centr.*, **44,** 147.) Cativo balsam contains approximately 75–80 per cent. of acid resins, 13 per cent. of indifferent resene, and 2 per cent. of essential oil. The acid values vary from 126·92 to 131·97, the ester numbers from 25·27 to 28·13. Both the acid resins and the resene form amorphous yellow viscous masses. The author considers that the characters of the oleo-resin point to the probability of its being derived from a member of the Cæsapineæ.

Cellotropin. (*Pharm. Zeit.*, **49,** 272.) This is the monobenzoyl ester of arbutin, $C_6H_4\langle^{OC_6H_{11}O_5}_{OCOC_6H_5}$ obtained by benzoylating arbutin in neutral solutions. Care must be taken to avoid the formation of the higher esters, which are amorphous. Cellotropin is a white crystalline powder, without taste or odour; solubility in water, 1 : 1,300; m.p., 184·5°C. It is introduced for use as a general internal disinfectant, being given in doses of 5–8 grs. 3 times a day. It is quite nontoxic.

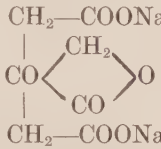
Cerolin. (*Pharm. Centr.*, **46,** 192.) This name has been applied to a neutral fatty extract obtained by treating dried yeast with alcohol. It is stated to act as a pleasant and efficient laxative, which is mild in action, and does not occasion subsequent constipation after prolonged use. It is prescribed in doses of $1\frac{1}{2}$ gr. 3 times a day in pill form, massed with licorice extract and marshmallow powder. It is also an active remedy in furunculosis. It may be prescribed in twice the above dose without producing any unpleasant effects.

Chloral-Acetone-Chloroform. (*Pharm. Zeit.*, **49,** 460.) Chloral hydrate, 16·55 Gm., is melted, or 18·65 Gm. of crystalline acetone chloroform, and kept at 75–80°C. for half an hour. The solid mass is then warmed with twice its weight of benzol or other organic solvent. On cooling, chloral-acetone-chloroform crystallizes out in fine asbestos-like needles. When purified by recrystallization it melts at 65°C. It has a slight camphora-

ceous odour and taste. Its solubility in cold water is 1 : 100. It is introduced as a hypnotic as a substitute for chloral. It is stated that its administration is not followed by the ill-effects which detract from the value of chloral hydrate.

Cinchonine Sulphate for Coryza. J. E. Tolley. (*Merck's Report*, **1903,** through *Annales de Pharm.*, **9,** 301.) Cinchonine sulphate given in cachets in doses of 4–6 grs. 3 times a day, has been found most efficacious in the treatment of coryza and other affections of the nasal or pharyngeal mucous membrane.

Citarine. (*Nouv. Remèdes*, **20,** 109.) Under this name sodium anhydromethylene citrate,



obtained by the action of formaldehyde on sodium citrate, has been introduced as a uric acid solvent in the treatment of gout. It is given in doses of 30 grs. per diem, taken 3 times daily in 10-gr. portions.

Coca Leaves, Structure of. H. G. Greenish. (*Pharm. Journ.* [4], **18,** 493.) The anatomical structure of Bolivian and Truxillo coca leaves is described and illustrated in detail, and the differences described. The original paper should be consulted, since its matter does not lend itself to condensation.

Cocaine Lactate. J. Albrecht. (*Merck's Report*, **17,** 51.) Cocaine lactate, $C_{17}H_{21}NO_4.C_3H_6O_3$, is a yellowish crystalline and honey-like mass. It is freely soluble in water or alcohol.

For the anæsthesia of dentine the author recommends a medium consisting of powdered sodium carbonate, potassium carbonate, or sodium bicarbonate, and a solution of cocaine lactate in alcohol. It is applied in the following manner:—

The tooth cavity should be dried, a little of one of the above named carbonates introduced therein, and subsequently a little of the cocaine solution. The tooth should then be quickly closed with soft wax. After a few minutes all sensitiveness disappears, and drilling operations may be proceeded with. In the case of very sensitive individuals the fluid is renewed

before closing the cavity, and the action of the anæsthetic may be further intensified by introducing, after the removal of the preparation, fresh lactate of cocaine and then washing out with alcohol. The anæsthetic effect is produced by the cocaine, whilst the carbonic acid liberated paralyzes the protoplasm of the tooth. The alcohol is added to maintain the cocaine in solution, in which condition alone it exerts its anæsthetic action.

Cod Liver Oil and its Adulterants. E. H. Gane. (*Proc. Amer. Pharm. Assoc.*, **51,** 222.) After reviewing the history of the adulteration and the accepted tests for detecting the same, the author gives the following simple tests which may be performed in the pharmacy:—

1. Place half an ounce of the oil in a test-tube, and allow it to stand in shaved ice for 2 hours. A pure non-freezing oil should remain perfectly clear.

2. Boil 1 fluid drachm of the oil with half an ounce of a 5 per cent. alcoholic solution of KOH until a clear solution is formed. Dilute with 2 oz. of water and heat until all the alcohol is driven off. Add excess of HCl, and note the odour of the fatty acids; a strong herring-like odour, or a bad smelling liquid indicates adulteration with seal or other oils. A faint herring odour may be disregarded. Pure cod liver oil usually yields a soap and fatty acids of a fishy smell, but with no bad odour.

3. Place 20 drops of the oil in a watch-glass, and add 5 drops of strong HNO_3. Stir well, and note colour. Pure cod liver oil gives a beautiful rose-red colour which changes in about half an hour to lemon yellow. A dirty-brown or blackish mixture indicates adulteration.

Colocynth Pulp, Determination of Oil in. E. Dowzard. (*Pharm Journ.* [4], **17,** 400.) According to the B.P., colocynth should only yield a trace of fixed oil to ether; this is to ensure the absence of seeds, which constitute about two-thirds the weight of the imported fruit, and contain a large amount of oil.

Pure colocynth pulp, free from seeds, yields about 3 per cent. of soluble matter when extracted with ether; this can hardly be called a trace, but the greater part of this is colocynthin, the active principle of the pulp. To make an accurate determination of the oil of colocynth, petroleum ether (redistilled)

should be used, in which colocynthin is insoluble, while the oil is readily extracted.

The following examples show how inaccurate the results are when ether is used, and the necessity for using petroleum ether to obtain correct results :—

Pulp Free from Seeds.	Ether Extract.
No. 1.	3·5 per cent.
No. 2.	3·1 ,, ,,
	Petroleum Extract.
No. 3.	1·16 per cent.

After removing the oil from No. 3 with petroleum ether the residue was extracted with ether, when 2·73 per cent. of soluble matter (colocynthin) was obtained.

Pulp Free from Seeds.	Petroleum Extract.
No. 4.	1·33 per cent.
No. 5.	1·20 ,, ,,
No. 6.	0·98 ,, ,,
No. 7.	0·60 ,, ,,
No. 8.	0·58 ,, ,,
No. 9.	0·52 ,, ,,

The above figures were obtained in the examination of large batches of powdered colocynth, and prove that it can be prepared on a commercial scale with an oil content of less than 1·5 per cent.

Two per cent. of oil might be fixed as the maximum amount.

Croton Oil, Characters of. C. Sigalus. (*Bull. Soc. Pharm. de Bordeaux*, through *Journ. Pharm. Chim.* [6], **18,** 208.) The author has examined nine authentic samples of croton oil. He finds that the mean critical temperatures of solution in absolute alcohol is 41·22°C.; with alcohol 95 per cent. it oscillates from 87 to 84°C. The mean refraction number was 1·4793. The optical rotation was markedly higher than that recorded by previous observers, the mean figure being + 75° in a 200 mm. tube. Incidentally, the rotation of castor oil was found to be + 42° for 200 mm. A so-called sample of "croton oil" from Singapore was found to be optically inactive and devoid of rubefacient action. The oil of the seeds *Aleurites triloba* and of *Curcas purgans* were also found to be devoid of action on polarized light.

Cypress Oil as a Remedy for Whooping Cough. O. Soltmann. (*Schimmel's Report, May,* **1904,** 37.) A 25 per cent. solution of

cypress oil in alcohol, used by sprinkling 4 times daily over the bedclothes, pillows and underclothing of children suffering from whooping cough, has been found to be an excellent remedy in the treatment of the disease. The number of paroxysms was reduced promptly and rapidly, and the whole course of the disease followed a mild course. No ill-effects were found to follow its use. In the nineteen cases treated only two showed loss of weight after cure by the treatment, and these were subject to severe complications when the drug was first employed on them. In all the others a decided increase in weight was noted after treatment.

Dionine as an Ocular Analgesic. J. Hinshelwood. (*Brit. Med. Journ.* [1], **1904,** 1009.) A 5 per cent. aqueous solution, or an ointment of similar strength, with vaseline, is found to act as an efficient analgesic in many painful affections of the eye. The ointment is preferable where lachrymation is profuse, since, under these circumstances, the solution is soon washed out of the eye. The application does not modify the sense of touch, so that dionine exercises no anæsthetic action, and is, therefore, of no use for performing operations; but it is most efficient in relieving pain. One effect is sometimes observed after the first application of dionine, an intense chemosis of the conjunctiva occurring, which might occasion alarm; but this rapidly subsides, and is not observed after the first or second application. Its appearance seems to indicate that the full analgesic effect of the drug will be attained. The applications may be used every 4, 6 or 8 hours, according to the effect produced. When the pain is not very severe a 2 per cent. solution or ointment may suffice to give relief.

Dipteryx odorata; a new Copal from the Fruit, and Kino from the Bark of. E. Heckel, H. de Cordemoy and F. Schlagenhauffen. (*Répertoire,* **60,** 97.) In a consignment of the fruits of *Dipteryx odorata* sent from French Guiana for examination, the mesocarp was found to be loaded with a brownish or greenish-yellow resinous substance, while the bottom of the tin-lined case in which they were imported was covered with granules of the same secretion removed by breaking up of the epicarps in transit. Examination showed that the mesocarp contained numerous receptacles of secretion filled with this copal, which were present also, but less numerous, in the epicarp. A section of a branch showed but few of these

resin secreting cells, but a large number of grouped receptacles filled with a red kino.

The resin from the hard shell was extracted by boiling with water and removing the dark-brown substance which rose to the surface. This was then treated with ether, which removed the resin, and on evaporation left it as a pale, hard residue, fusible at the temperature of the water-bath. The pericarp, when extracted with ether, gave the same resin. It was extracted less readily by alcohol, and was then obtained much darker in colour.

Drugs, the Ash of Certain. J. C. Umney. (*Pharm. Journ.* [4], 32, 879.) Commenting on the results obtained by Chattaway and Moor (see p. 206) and himself, the author discusses the apparent discrepancies which have arisen.

Cimicifuga Rhizome. The author has stated that the ash percentage should not exceed 10. This figure is in excess of that recorded by Barclay, Priest, and Chattaway and Moor, the last-named suggesting 8 per cent. as a standard. The average ash of well-brushed samples of rhizome is found to be 5·5 per cent., but several samples were examined where the rhizome had a large proportion of rootlets, where the ash was as high as 13·5 per cent., and that of one powder recently examined was as high as 17·4 per cent. This shows, therefore, the necessity of the cleansing process of such drugs as these before utilization for pharmacy, either for the making of galenical preparations or pulverization. After consideration of the whole of the circumstances, the suggestion of an average, or even maximum, ash of not more than 8 per cent. made by Chattaway and Moor should be accepted as not unreasonable.

Colocynth. Chattaway and Moor question the policy of raising the standard for ash in colocynth pulp from 9 to 10 per cent. as suggested by the author (*Year-Book*, **1903,** 244). The experiments recorded by Greenish (*Year-Book*, **1901,** 140) appear to show a very wide range of ash for pulp derived from different sources. The author's experience is that the ash may vary from 7·2 per cent. up to 13·5 per cent. in samples of Turkish colocynth, and that those having these extreme limits of ash may be practically without indication of seeds, as shown by the absence of fixed oil, and also by the microscopical examination of the powder. No great importance should be attached to ash assay for the determination of the freedom from seeds

or otherwise of a sample of powdered colocynth pulp, and reliance should be placed rather on the microscopical characters and freedom from fixed oil.

Conium Leaves. The discrepancy between the figures that Barclay and the author obtained and those recorded by Chattaway and Moor (which are as follows: Umney, 15; Barclay, 15·1; Chattaway and Moor, 20) appears to be due to the proportion of leaves and stalks in the sample of drug. In this case the ash of the leaves (13–14·5 per cent.) appears to be lower than the ash of the stalks (16–18 per cent.); this is almost what might be expected, taking into consideration the structure of the leaves of the plant. As a result of many further observations, a maximum of ash of not more than 16 per cent. is suggested.

Cubebs. The maximum ash suggested by the author is 7 per cent., and by Chattaway and Moor 8 per cent. In the determination of the ash of cubebs there are several important points which should not be overlooked. The cubebs met with in commerce contain very varying proportions of fruits and stalks. The ash of the picked fruit varies between 5·5 and 6·5 per cent., but the ash of the stalks varies between 10 and 11 per cent., and it is upon the freedom, therefore, from stalks that the lowness of the ash largely depends. It is taken for granted that the records of the ash of drugs are usually made upon whole air-dried substances, but in the case of cubebs it should be remembered that the powder dried at 100°C. will lose as much as 20 per cent. in moisture and volatile oil, the proportion of volatile oil being as much as 16 per cent. The author would certainly maintain as a maximum ash for cubebs not more than 7 per cent.

Elaterium. Chattaway and Moor state that, in their opinion the figure of 14 per cent. as a maximum for ash is somewhat high—quoting one obtained by themselves of 3·7, and by Priest of 7·9 per cent. Many samples have been examined, varying over a wide range, from 3·2 to 19·1 per cent., but the average is 6·0 per cent. of ash. Growers state that there is no necessity for the ash to exceed 5 per cent., provided the elaterium be properly prepared. The ash maximum of elaterium might therefore be reduced from 14 per cent. to 10 per cent., or slightly lower.

Jaborandi Leaves. The determination of the ash of this drug has not been very decisively stated, in consequence of the diffi-

culty of obtaining the leaves of *Pilocarpus jaborandi*—the official variety. The supplies of the official leaves recently examined yielded an ash of 5·6 per cent. for the picked leaflets, and 3·8 per cent. for separated stems. The average of a fair sample gave 5·4 per cent. A maximum of ash 7 per cent. might be maintained.

Lobelia. The ash of lobelia, for which as a maximum the author suggested 12 per cent., would be better stated, according to Chattaway and Moor, as 10 per cent. The drug of commerce consists of the whole dried flowering herb, as described in the B.P., 1898, the proportion of stems and the leaves naturally varying. The ash of the leaves ranges between 10 and 12 per cent., but the ash of the stems is approximately 3·5 per cent., and therefore a very considerable difference will arise in the ash of the commercial drug, according to the ratio of leaves and stems present. In 100 parts of the drug by weight the average weight of leaves is 55 parts, but it must not be overlooked that the leaves yield a much higher proportion of extractive and alkaloid than the stems, and that, therefore, as high a ratio as possible of leaves to stems in the drug is to be commended. There is no objection to the statement of a high ash maximum (say 12), though as an average probably 9–10 per cent. would be approximately correct.

Rhubarb. The enormous variation in the ash of rhubarb is a matter to which attention has been called again and again during the past thirty years. *Pharmacographia*, 2nd edition, p. 500, records an instance where the ash of rhubarb was as high as 43·27. The average ash of the rhubarb met with in commerce during the past ten years has varied between 7·5 and 15 per cent., and really it is not a matter of very great importance to fix an ash standard for the drug. It would be of importance to fix a standard as low as possible if the extractive of the rhubarb were reduced by the raising of the salts which give rise to the ash ; but this is not by any means constant. No limit of ash should be stated, but reliance placed on more definite chemical characters for valuation purposes.

Stramonium Leaves. Chattaway and Moor suggest the raising of the ash maximum of 15 per cent. to 20 per cent. The ash of the leaves of stramonium undoubtedly shows a considerable variation, and it is one that appears to be considerably influenced by the time of the collection of the leaves, and also the soil and manuring of it on which the plant is grown. The range of ash obtained by the author is from 13·6 to 20·3 per cent., and

therefore it would appear to be almost necessary to fix a maximum of ash as high as 20 per cent., unless it can be shown that in a drug which is high in ash there is a considerable deficiency in alkaloidal strength. This is a matter that will require extended research.

Drugs, Ash of Crude, and Compounds. W. Chattaway and C. G. Moor. (*Analyst*, **28**, 202.) The authors have determined the ash content of official drugs and compounds, and give their results in tabular form, comparing them with the figures previously obtained by Moor and Priest, by J. C. Umney, and by J. Barclay as follows :—

Drug.	Moor and Priest.	J. C. Umney.	J. Barclay.	Chattaway and Moor.
Acaciæ gum	British Pharmacopœia limit, 4·0 ; all observers agree with this.			
Aconiti rad.	4·7, 3·5, 3·8, 8·6, 5·0	6.0	2·0 to 4·5, P. 7·6	4·5 to 6·0
Aloës	2·6, 2·7, 1·6, 1·7, 4·1, 2·6	3·0	1·7 1·2, 2·1, 0·8, P. 2·6, 2·1 1·5	1·0 to 4·0
Ammoniacum	2·3, 2·0, 1·6, 2·1, 5·6, 15·4, 2·3, 1·5	7·5	2·0	5·0
Anethi fruct.	6·2, 7·5	8·0	7·7	6·0 to 7·0
Anisi fruct.	4·9, 3·6, P. 11·4, 11·36	8·0	7·7, P. 8·3, 10·8	10·0
Anthemidis flor.	4·3	6·0	5·7, 5·8, 5·5, 5·5, P. 6·3	6·0
Araroba	9·8, 5·3	7·5	2·5	7·5
Arnicæ rad.	9·4, 8·9, 6·2, 33·7. 31·7, 15·5, 12·5, 12·1, 18·3	10·0	7·1	10·0
Asafœtida	figures vary from 2 to 60	20·0	—	20·0
Aurantii cort. sicc	6·3, 6·5, 5·6, 6·2	7·0	5·2, 4·5, 6·1	7·0
Balsam. Peru	0·2	—	—	1·0
Balsam. Tolu	0·65	—	0·4, 0·34, 0·4, 0·39	1·0
Belladon. rad.	6·4, 8·1, 9·2, 7·2, 6·1, 7·3	7·0	9·3, P. 5·3	9·0
Benzoin	0·5, 0·8, 1·0, 0·9, 2·5, 0·28, 0·82	2·0	0·9	2·0
Buchu fol.	4·8, 4·4	5·0	4·7, 4·6	5·0
Calumbæ rad.	5·1, 5·7, 7·4, 7·8, P. 11·8, 10·3	6·0	4·7, P. 7·0	8·0

Drug.	Moor and Priest.	J. C. Umney.	J. Barclay.	Chattaway and Moor.
Cambogia	0·84, 0·75	3·0	0·4, P. 1·8	2·0
Cannabis indica	13·8, 12·7	15·0	15·0. P. 14·9	15·0
Cantharides	7·4, 6·0, 10·0	7·0	51, P. 7·6	7·0
Capsici fruct.	4·0 to 7·5	6·0	5·4, 6·1	—
Cardamomi sem.	4·5, 5·7, 3·7, 5·1, 5·1, 3·7, 3·3	6·0	7·5, 3·5, 3·7	6·0
Carui fruct.	5·5, 7·5	8·0	6.2, 5·7, 5·5, P. 6·7, 6·2	8·0
Caryophyllum	5·4, 6·1, 5·2, 6·1, 6·0, 5·9, 5·2	6·0	4·6, 5·4, 6·0, P. 4·7	7·0
Cascara sagrada	4·6, 3·9, 7·0, 5·2	5·0	5·5, 6·1	7·0
Cascarilla cort.	8·8, 7·5, P. 10·7	10·0	8·3	10·0
Catechu	3·6, 4·0, 4·4	5 0	3·4, P. 5·3	5·0
Chiretta	3·5, 3·0	6·0	4·0, P. 3·1	4·0 to 6·0
Cimicifugæ rhiz.	7·1, 5·7, 7·0, 5·6	10·0	6·2	8·0
Cinchona	4·0, 13·0 (contained mineral matter)	4·0	1·4, P. 5·2	5·0
Cinnamon	4·1, 4·8, 5·9, 4·6, 5·5, P. 8·2	6·0	4·9, 4·2	6·0
Cocæ fol.	6·3, 8·0, 7·2, 6·8	8·0	4·0, 8·1	8·0
Coccus cacti	8·2, 5·2, 7·8, 30·8, 31·7	8·0	3·4, P. 9·5	6·0
Colchici corm.	2·4, 2·2, 2·2	3·0	1·8, P. 2·5	3·0
Colchici sem.	5·1, 2·6	5·0	4·0, 5·2	6·0
Colocynth. pulp.	7·3, 7·2, 8·6, 10·1, 10·5, 9·2, 8·2, 12·1	10·0	12·0, 10·1, 11·4, 12·4, 11·2, 11·7, 11·7	9·0
Conii fol.	—	15·0	15·1	20·0
Conii fruct.	—	7·0	5·5	—
Coriandri fruct.	5·8	6·0	4·1, 4·9	6·0
Crocus	4·8, 4·7, 5·0, 4·9	7·0	—	7·0
Cubebæ fruct.	7·3, 5·3, pulv. 9·8	7·0	6·4, P. 7·3	8·0
Cuspariæ cort.	6·7, 6·2	9·0	8·0	8·0
Cusso	4·7	7·0	9·4	—
Digitalis fol.	8·1, P. 10·6	10·0	11·2, P. 9·4	10·0
Elaterium	7·9	14·0	—	—
Ergot	3·5, 3·5, 3·7, 5·7, P. 5·7	6·0	3·2, 2·8, 2·9, 3·1, 3·7, P. 3·2, 4·1, 2·7, 4·3, 3·1	6·0
Eucalypti gum	0·62	0·5	0·2	1·0
Euonymi cort.	9·6	10·0	8·9	10·0
Filix mas	4·9, 6·2	5·0	3·3	—
Fœniculi fruct.	12·1, 8·7, 9·1	10·0	8·5, P. 10·8	12·0

Drug.	Moor and Priest.	J. C. Umney.	J. Barclay.	Chattaway and Moor.
Galbanum . . .	6·6, 7·2	8·0	4·4	8·0
Galla	2·3, 1·3	3·0	1·76, P. 1·75	5·0
Gelsemii rad. . .	2·1, 2·3, 2·1	3·0	1·6, 1·8	3·0
Gentianæ rad. . .	3·3, 4·0, 2·9, P. 2·2	5·0	2·4, 3·5, P. 4·5	5·0
Glycyrrhizæ rad. .	3·6, P. 3·3	4·0	4·8, P. 3·3, 2·8, 3·7	5·0
Granati cort. . .	13·1, 15·5	15·0	—	16·0
Guaiaci lig.. . .	1·3	3·0	1·1	2·0
Guaiaci res. . . .	1·4, 1·3, 3·7, 5·6	3·0	0·6	2·0
Hæmatoxyli lignum	2·1, 1·8, 2·7	2·0	—	2·5
Hamamelidis fol. .	8·5, 5·1, 4·6	8·0	5·5, 4·3	8·0
Hamamelidis cort..	4·7, 5·1, 5·0	5·0	3·4	6·0
Hemidesmi rad. .	4·4	4·0	3·7	5·0
Hydrastis rhiz.. .	12·0, 8·5, 4·7	10·0	4·3	—
Hyoscyami fol. .	11·8, 8·6	12·0	21·9 Exot., 14·0 Ang., 12·4 P. Ang.	—
Ipecacunhæ rad. .	3·2, 2·1, 2·9, 2·5, 3·1	5·0	2·0, to 3·4	5·0
Jaborandi fol. . .	6·0, 8·1, P. 11·7	7·0	4·5, 4·6, 4·2, 4·0	8·0
Kino	1·4	2·0	0·8	2·0
Krameriæ rad. .	1·6	2·0	2·5, P. 4·4	2·0
Limonis cort. . .	4·9, 5·3	5·0	3·7	5·0
Linum	3·6, 3·3, 3·6	5·0	—	5·0
Lobelia . . .	9·0	12·0	3·4, 4·7, 3·8, P. 9·5	10·0
Lupulinum . . .	15·6	14·0	13·4	—
Lupulus . . .	10·8	7·0	6·9, 7·5	10·0
Mezerei cort. . .	3·1, 3·0	4·0	3·1	4·0
Moschus . . .	5·2	8·0		8·0
Myristica . . .	2·4, 2·1	4·0	1·9, 1·7, P. 2·5	5·0
Myrrha	3·8, 3·6, 9·9, 4·2, 17·0, 3·2, 9·8, 9·8, 3·8	6·0	2·6, 2·6, 6·7, P. 9·8, 10·7	6·0
Nux vomica . .	2·0, 1·3, 1·1	2·0	1·1, 2·4	2·0
Papaveris capsulæ .	9·1	10·0	11·3, 8·6	12·0
Pareiræ rad. . .	3·4, 3·6, 3·5	4·0	2·5	5·0
Physostigmatis sem.	3·9	4·0	3·1	4·0
Pimento . . .	4·2	5·0	2·8, 3·5	5·0
Piper album . .	1·0 to 3·0	—	—	30·0
Piper nigrum . .	4·0 to 7·0	7·0	3·3, P. 6·3	4·0 to 7·0
Podophylli rhiz. .	2·9	5·0	3·2	5·0
Pruni virg. cort. .	5·1, 4·2, 4·0, 4·6	6·0	2·9	6·0
Petrocarpi lig. . .	1·7	1·0	1·2	2·0
Pyrethri rad. . .	6·0, 5·3, 4·9, P. 18·5, 17·5	5·0	3·9	6·0
Quassiæ lig. . .	3·4, 3·7	4·0	2·5	4·0
Quillaiæ cort. . .	14·6, 14·1	12·0	8·0, 8·2	—

Drug.	Moor and Priest.	J. C. Umney.	J. Barclay.	Chattaway and Moor.
Rhei rad. . . .	12·2, 11·0, P. 7·4	12·0	4·9, 7·3, P. 8·8, 10·7	30·0
Rhœados petala .	18·0, 20·0	16·0	—	20·0
Rosæ gallic. petala	2·8	4·0	1·8, 3·1	4·0
Sarsæ rad. . . .	6·5	8·0	6·0, 10·5, 5·7, 5·1	—
Sassafras rad. . .	0·64	2·0	0·8	2·0
Scammoniæ rad. .	11·1, 10·9	12·0	9·1	12·0
Scammonium . .	7·9, 4·9, 6·1	—	3·4	6·0
Scilla	3·8, 2·8, 2·9, 3·4, 2·5, P. 2·5	4·0	2·1 P. 2·5	4·0
Scoparii cacumina .	3·5	4·0	2·3	4·0
Senegæ rad. . .	4·0, 3·1, 4·6, P. 24·0	5·0	4·2, 4·4	5·0
Sennæ fol. . . .	5·6, 8·6, 9·1, 10·9, 10·4, 8·9, 7·2	14·0	7·9, 8·4, 8·5, 7·3, 8·1, 8·6, P. 9·4	14·0
Serpentariæ rad. .	8·9, 30·7, 10·1, 13·4, 6·0, 7·1, P. 18·0, 18·4	10·0	5·7 10·1	9·0
Sinapis	4·0 to 6·0	5·0	4·0, 4·3, 4·3	4·0 to 6·0
Staphisagriæ sem. .	26·0, 14·0	15·0	13·3, 11·7	15·0
Stramonii fol. . .	18·1, P. 20·1	15·0	20·2, 19·3, 13·9, 22·0	20·0
Stramonii sem. .	3·0	3·0	2·4	3·0
Strophanthi sem. .	3·8, 3·4, 3·4, 4·0	5·0	3·8	5·0
Sumbul rad. . .	5·7	6·0	6·1	7·0
Taraxaci rad. . .	—	7·0	3·2	7·0
Tragacanth . .	2·9, 4·9	4·0	3·2, 2·0, 1·7, P. 2·1, 2·2	5·0
Uvæ ursi fol. . .	3·7	4·0	2·4	4·0
Valerianæ rhiz. .	8·0, 8·6, 13·7, 15·1, 19·5, P. 20·9	10·0	11·6, 10·0, 17·4	9·0
Zingiber . . .	3·0 to 5·0	5·0	2·4 to 6	3·0 to 6·0

Compound Powders of the British Pharmacopœia. The Irish Local Government Board Standards include ash figures for certain of the British Pharmacopœia *Pulveres*, and the authors have compared these figures with some obtained by themselves :—

	C. and M.	I. L. G. B.
Pulv. Catechu Co.	3·0 . .	3·3
,, Cinnamomi Co.	5·9 . .	4·3
,, Cretæ Aromat.	22·5 . .	22·0
,, Cretæ Aromat. c. Opio . . .	20·6 . .	22·0
,, Glycyrrhizæ Co.	4·1 to 5·3 .	4·5

	C. and M.	I. L. G. B.
Pulv. Ipecac. Co.	7·9·0 . .	81·1
,, Jalapæ Co.	23·2 . .	20·0
,, Rhei Co.	63 to 65 . .	68·0
,, Scammoniæ Co.	1·9 . .	2·0

The Irish Local Government Board Standards are termed "suggested standards," but their analysts are directed to condemn samples which fall below them. It seems desirable that a range should be given, as it is obvious that, however carefully medicines may be prepared, they cannot be set to correspond with a precise figure except in certain cases, which are comparatively few.

The only two substances mentioned above that call for comment are the figures for Pulv. Glycyrrhizæ Co. The total ash figure may vary from 4·1 to 5·3, but the figure for soluble ash appears to be more important, and shou'd not fall below 2·5.

Echinacea angustifolia. J. U. Lloyd. (*Amer. Journ. Pharm.*, **76,** 15.) Investigation has convinced the author that the root of *Echinacea angustifolia* is of undoubted value as a blood purifier, and as a palliative in cases of cancer. Owing to the resemblance of the flower heads of *Echinacea angustifolia*, "nigger head," to *Echinacea purpurcum*, "black sampson," and also to several species of plants related to the sunflower family, this drug is now, as found upon the market, of very uncertain quality. Large amounts of so-called *Echinacea* have been sold in commerce, differing in every way from the true drug, which grows in great abundance throughout Kansas, Oklahoma, Nebraska and other sections of the West and Southwest Large amounts of *Eryngium aquaticum* have been dug and sold as *Echinacea*.

Echinacea contains minute amounts of a colourless alkaloid, which, however, does not constitute the therapeutic principle of the drug. It contains much sugar, and large amounts of colouring matters, which prove injurious if allowed to remain in its preparations. The active constituent is a colourless, organic substance of acid reaction, which imparts the sensible properties to the drug, being intensely acrid and persistent—distressingly so in a pure condition. It exists in prime *Echinacea* in minute amounts, less than ½ of 1 per cent.

Characteristics. Echinacea root has a brown or brown-red colour. It is much wrinkled longitudinally, and the folds of

the shrunken epidermis sometimes twist about the root in spiral form. When sliced transversely, the yellowish medullary rays are seen to be separated from each other by a greenish pulp, and when the dried root is broken, the fracture always presents the appearance of having been afflicted with dry rot. Upon chewing the root of prime *Echinacea*, a sweetish taste first presents itself, which upon prolonged chewing becomes acrid and tingling, which remains long to affect the tongue. This sensation reminds one of aconite, but it is devoid of the benumbing quality of aconite, and, unlike that drug, it increases the flow of saliva, instead of inducing dryness of the tongue. In early experience with the drug, insipid, tasteless lots of the genuine plant were met with which proved worthless in medicine. These specimens all came from low, wet lands east of the Mississippi River, for the plant is not confined exclusively to the West, and varies much in quality.

Empyroform (*Merck's Report*, **17,** 61.) Empyroform is a condensation product of tar and formaldehyde. It is a brown powder, insoluble in water but freely soluble in acetone, chloroform and caustic alkalies. The preparation is remarkable for its antipruritic and desiccating properties; it causes neither local irritation nor toxic symptoms and is free from any smell of tar; it should be prescribed as a 1-5 per cent. solution in chloroform or acetone, as a 1-50 per cent. ointment or paste, or as a dusting powder mixed with oxide of zinc and starch. For applications with the brush Sklarek recommends the following composition: Empyroform, 15; talc. venet.; glycerini ââ, 10; aq. dest., 20; or S. V. R. et aq. dest. ââ, 10. Apply with the brush. To be shaken.

Esterdermasan. R. Pfeiffer. (*Merck's Report*, **17,** 64.) Esterdermasan is a superfatted soap containing 10 per cent. uncombined salicylic acid and saturated with salicylic acid esters. This has both the effect of increasing the proportion of salicylic acid and of providing the possibility of inducing a more rapid absorbtion. The area which requires treatment should be painted once or twice daily, according to its size, with 75–150 grs. of the preparation, and subsequently surrounded with cotton-wool. When applied in this way in acute muscular rheumatism the preparation produces at once a pleasant sensation of warmth and of lessened pain. Cases of this kind may

be cured within a short time, without the internal administration of salicylic acid. Esterdermasan is also available for the treatment of arthritis deformans, sciatica, tabetic pains and articular pains arising from acute diseases.

In veterinary medicine Lemke has cured lameness in horses in 8 days. It was likewise efficacious in cellulitis, elephantiasis and especially in spavin. It proved useful in the case of cows suffering from mastitis and dogs affected with muscular rheumatism. Good results may also be expected in affections of the tendons and their sheaths, where, after proper cleansing, the preparation should be applied by means of massage for 2–3 minutes.

Eucalyptol β-Naphthol. E. Liotard. (*Nouv. Remèdes*, **18,** 244.) This compound, $C_{10}H_{18}O_9C_{10}H_8O$, has been obtained in the form of white, silky needles. It differs somewhat in solubility from its components, and the colour reactions of the contained β-naphthol are modified.

Euguform. Weil (*Merck's Report*, **17,** 66) finds euguform valuable in the treatment of eczema attended with troublesome and unbearable itching, particularly in the case of children who cannot refrain from scratching. Weeping eczema has likewise been treated successfully and even cured. Euguform is preferably applied to the affected parts with a large camel-hair brush, after previously freeing them from adhering scabs. The healing effect of the preparation is particularly pronounced in weeping, but not in dry eczema.

Eumorphol. — Hirschof. (*Journ. Pharm. d'Anvers*, **59,** 147.) This name has been given to the serum obtained from rabbits and mice which have been kept for a period under the influence of morphine. It is stated that an antitoxin is thus produced which not only furnishes an antidote to opium poisoning, but affords a means of overcoming the morphine habit. So far neither local nor general secondary symptoms have been observed to follow the use of eumorphol.

Fomitin. (*Merck's Report*, **17,** 77.) Fomitin is a fluid extract prepared from Hymenomycetes, *Fomes cinnamomeus* and *F. igniarius* occurring as parasites on trees of the genus *Prunus*. It is a clear, reddish-brown fluid emitting a mushroom-

like odour and possessing a bitter taste, the active constituents of which probably consist of complex acids of the aromatic series. According to Th. Rosenbaum it is particularly indicated in cystitis, dysmenorrhœa, menorrhagia and hæmorrhoidal conditions of irritation. It is given in doses of 1–2 tablespoonfuls, which, even when administered continuously, do not interfere with the system in any way.

Formic Acid, Action of, on the Muscular System. E. Clément. (*Comptes rend.*, **138,** 785.) Experiments on healthy individuals, checked by repeated records with Mosso's ergograph, show that doses of 40 drops per diem., neutralized with $NaHCO_3$ and taken in two portions in half a glassful of water, have a remarkable stimulating effect on the muscular system, enabling the subject to perform 5 times as much muscular work after its use as before. The fatigued muscles, too, become recuperated very rapidly, so that after a short rest another prolonged and arduous muscular exertion can be performed without fatigue. Treatment with formic acid increases both the strength and endurance in a wonderful manner.

Formic Acid, Action of, on the Organism. L. Garrigue. (*Comptes rend.*, **138,** 837.) The above results of E. Clément confirm the experiences previously published by the author as to the powerful, and apparently innocuous action of formates on the system. Rabbits were found to bear, without ill effects, relatively large doses of sodium and calcium formate given by hypodermic injection. Their vivacity and appetite were considerably increased. The author then experimented on himself, administering these salts both hypodermically and by the mouth. He found that his physical and mental activity was notably increased, and the appetite was improved. The dose taken was 45 grs. at each meal. He then took 15 grs. daily for a month without experiencing any ill-effect. The first action of formates or formic acid is to increase the arterial pressure. The patient experiences a feeling of well-being, is more cheerful, better sleep is enjoyed, and with tuberculous subjects the appetite is notably improved. The amount of urea excreted is increased to nearly double.

Fucol, a New Substitute for Cod Liver Oil. H. Norrenberg. (*Pharm. Centr.*, **45,** 33.) The following preparation of "Fucol" from torrefied algæ has been patented: Algæ rich

in iodine are roasted in such a manner as to reduce them to a brittle condition and to produce an empyreumatic oil which contains much iodine. The torrefied substance is then extracted with certain oils which dissolve this empyreumatic substance and produce "Fucol." It is an oily fluid with a greenish colour, and a flavour resembling that of roasted coffee. It may be used as a substitute for cod liver oil, either alone or medicated with phosphorus, creosote, iron iodide or similar drugs. One c.c. of fucol dissolved in 1 c.c. of $CHCl_3$, and treated with 1 drop of H_2SO_4, gives, on agitation, a fine green colour.

Gentian Root Powder Adulterated with Powdered Almond Shells and Pine Wood. H. S. Collins. (*Chem. and Drugg.*, **64,** 403.) Several specimens, mostly imported, of powdered gentian root have been found to be grossly adulterated. The appearance and aroma of the powders were all that could be desired, and the amount of ash yielded on ignition in most cases gave no ground for suspicion. A microscopic examination, however, at once revealed the presence of an adulterant, an approximate separation of which was readily effected by elutriation.

On shaking the adulterated powder with water in a test-tube, and allowing to stand 2 or 3 minutes, a portion heavier than the remainder rapidly separated. The supernatant liquid was poured off, and the sediment again washed as before. Both portions were examined under the microscope, and it was found that the deposit consists entirely of powdered almond-shell. The adulterant is of a bright brown colour, admirably adapted to the purpose for which it is used, and it certainly tends to give the powder a more attractive appearance.

Three samples from totally different sources were adulterated in this manner, although all were guaranteed genuine; and in one case the guarantee was accompanied with the additional assurance, "free from olive-stones." A fourth lot had also had added to it a large percentage of powdered pine wood, coloured to resemble gentian. The difficulty in the last case was to discover the nature of the adulterant, but 70 per cent. alcohol was used to effect a separation. This powder also contained much siliceous matter, which accounted for a high percentage of ash. A fifth sample also contained powdered woody tissue, but the author was unable to recognize its source.

The following are the percentages of ash yielded by powdered gentian, powdered almond shell, and the adulterated samples:—

Powdered gentian	2·5 to 5 per cent. ash.
„ almond shell (two samples)	3·1 and 3·25 per cent.
Sample No. 1	4·05 per cent.
„ „ 2	5·65 „ „
„ „ 3	3·65 „ „
„ „ 4	9·0 „ „
„ „ 5	not determined.

In samples Nos. 1, 2 and 3 the adulterant was powdered almond shell, and 4 and 5 pine wood and woody tissue respectively, in addition to almond shell.

Attention is directed to the fact that a determination of ash alone is practically powerless to deal with such cases of adulteration, but microscopical examination affords a ready and reliable means of determining the genuineness or otherwise of powdered drugs.

Gum Chicle, Chemical Characters of. Frank O. Tayler. (*Amer. Journ. Pharm.*, **75,** 513.) The sample of gum chicle examined gave 0·2 per cent. of ash; moisture, 2·2 per cent.; soluble in $CHCl_3$, 82·7 per cent.; soluble in C_6H_6, 84·7 per cent.; acid value, 52; esters, none.

Hartshorn, Characters of the True Empyreumatic Oil of. E. Hirschsohn. (*Pharm. Centr.*, **44,** 867.) Genuine *Oleum cornu cervi* is entirely soluble in alcohol 90–95 per cent., amyl alcohol, aniline, ether, benzol, chloroform, carbon disulphide, olive oil and turpentine; almost entirely soluble in acetic acid; not entirely soluble in petroleum spirit; gives a turbid solution with aldehyde. On shaking out with water, the aqueous layer gives no reaction for furfural with aniline and hydrochloric acid; it is alkaline; with ferric chloride it gives a yellow-red colour, and a precipitate with bromine water. The petroleum ether extract, 1 : 20, gives a red colour on being shaken up with a 1 per cent. solution of copper acetate. Certain samples of cheap *Oleum cornu cervi*, which gave a separation of oily drops when dissolved in some of the above-named solvents, were found to be adulterated with 20 per cent. of naphtha or naphtha residues.

Hetralin. — Ledermann. (*Therap. Monats.*, **18,** 151.) Hetralin is dioxybenzol-hexamethylene-tetramine, which has been introduced as a substitute for urotropine and helmitol in gonorrhœa, cystitis and other urino-genital affections. It may be given in doses of 7½ grs. 3 or 4 times a day without deranging the digestive functions, or interfering with the kidneys.

Hops, Valuation of. E. Hantke. (*Zeit. ges. Brauw.*, **26,** 217, through *Chem. Centr.* [1], **1903,** 1099.) The antiseptic action of hops is due to the presence of a soft resin, soluble in petroleum ether. This body possesses a more powerful antiseptic action than salicylic acid, but from its cost is not available for practical application. The quantitative determination of this soft resin serves, however, as a factor for determining the quality of hops, which should yield at least 12 per cent. of this body, together with 2·5 per cent. of tannin. The latter may be satisfactorily determined by means of Loewenthal's process. By determining the amount of ether extract in hops, before and after extraction with the wort, in the process of brewing, further indications of quality may be obtained. With good hops, at least 30 per cent. of the ether-soluble constituents are removed by the wort. The amount of water in good hops should be about 10 per cent. If this figure be exceeded, the hops will not keep well; if less than 9 per cent. of water be present, they will fall to pieces in the process of brewing. The author has detected the presence of an alkaloid in hop seeds, concerning which further details are promised.

Horse Chestnut, Therapeutic Preparations of. (*Pharm. Zeit.*, **48,** 844.) *Aesco-quinine.* A yellowish, amorphous, bitter powder readily soluble in water in the presence of a trace of acid; it contains 50 per cent. of quinine. It is a chemical compound of that base which the physiologically active glucosides of horse chestnut extract. It is recommended as a remedy in coughs, hoarseness, affections of the respiratory organs, catarrh, and as a nervine tonic, for which it is administered in the form of tablets, each containing 1½ gr. of aesco-quinine, which are given 3–5 times daily.

Kastanol. This name is given to a combination of Flügge's extract of horse chestnut with 8 per cent. of camphor. It is employed as a local anodyne application in rheumatism and other painful affections of the joints or muscles, being painted over the affected area. It is also recommended for chilblains.

Hydroacetyl Dioxide. (*Rev. Méd. Pharm.*, **10,** 802.) This body, $CH_3O.O.OH$, is formed by the addition of benzoylacetyl dioxide to water, when dibenzoyl peroxide is precipitated, while acetic acid and hydroacetyl dioxide remain in solution. It is stated to be a powerful but non-toxic antiseptic.

Hyoscyamus, Alkaloidal Standard for, and its Preparations.

T. Maben. (*Pharm. Journ.* [4], **18,** 5.) The standard for alkaloid in hyoscyamus leaves suggested in Chattaway's *Digest of Researches and Criticisms* is 0·08. Henbane leaves contain from 0·73 to 0·13 per cent. of alkaloid, the average being about 0·1, and it would seem to be inadvisable to adopt a lower standard. The remarks applied to green extract of belladonna also apply to extract of henbane, which might well be replaced by a spirituous extract containing 0·5 per cent. of alkaloid. Naylor and Bryant found 0·425 per cent. in a sample of B.P. extract, so that the figure named for spirituous extract is not excessive. On the same basis the strength of the tincture would be 0·01 per cent. of alkaloid.

Ibogaine, Physiological Action of.—Landrin and —Dybowski. (*Bull. Gén. de Therapeut.*, **146,** 773.) The plant "*Aboua*" or "*Iboga*" is generally employed by the natives of the Congo district, in a similar manner to kola, as a stimulant and sustenant. All parts of the plant are employed, but the root is considered to be the most active. The active principle is found to be ibogaine, $C_{26}H_{33}N_3O$, a crystalline base melting as 152°C., which is not stable in the air, becoming converted by exposure into a yellowish-brown amorphous body. The hydrochloride crystallizes readily from acid solutions. The base does not exist in the free state in the root, but is liberated by treating the powdered drug with milk of lime, extracting with ether, shaking out with dilute H_2SO_4, liberating with alkali and purifying by recrystallization from alcohol. The toxic dose is high, being 75 Mgm. for rabbits and guinea-pigs, and 60 Mgm. for dogs. It has a considerable anæsthetic action when applied locally, of similar nature to that produced by cocaine, but the caustic action of the base render it inapplicable for this purpose. Given internally in toxic doses, it is an excitant, and produces symptoms similar to alcoholic intoxication. When pushed to excess to the extent of 1 Gm. per kilo. of body-weight in the dog, paralysis and hypotension are produced, and the animal, after convulsions, finally dies of asphyxia. In general action iboga seems to take a place intermediate between coca and kola. Landrin finds that in doses of approximately 1 gr., given in pills 3 or 4 times a day, it forms a useful substitute for kola in those affections where the latter is indicated, such as neurasthenia. Since iboga appears to combine the local sedative effects of coca, with the stimulant action of kola, it should prove a useful addition to therapeutics.

Ichthyol Compounds, Ichthoform and Ichthargan, Therapeutics of. J. Burnett. (*Lancet* [1], **1904,** 717.) *Iron-ichthyol, or ferricthyol* is a blackish-brown amorphous powder, very light and non-hygroscopic. It is practically odourless and tasteless, and is best administered in cachet or in tablet form. The amount of iron contained in this preparation is about 3·5 per cent. Ferricthyol is an excellent remedy in secondary anæmia. In cases of chlorosis, on the other hand, no good results follow its persistent employment. Unna advises its adoption in all chronic conditions, especially in uticaria and analogous skin diseases, in papular and bullous affections, and in lichen as it occurs in children. In eczemas occurring in anæmic subjects the ichthyol in combination with iron improves the circulation, and so does good.

Sodium-ichthyol is a solid preparation and thus forms an excellent substitute for the ammonium salt for internal administration. It is not nearly so active in pulmonary disease as is the original ammonium salt, though it is perhaps a little more readily taken by fastidious patients. In chronic gastric catarrh it has the power of checking the fermentative processes which form such a troublesome element in many of these cases. Generally speaking, where ichthyol is indicated this preparation should be prescribed, except in cases of pulmonary disease in which the original ammonium salt alone should be employed.

Calcium-ichthyol is well suited for use in dermatological practice and is readily taken by children. It is not, however, such a generally useful salt as are some of the others.

The *zinc salt* finds many indications for its use in diseases of the skin and hence its value appeals most to dermatologists. It may be used as an ingredient in ointments and in certain cases is to be preferred to the ammonium salt.

Within the last few years ichthyol has been made use of as a vehicle for certain insoluble agents such as cresol, eucalyptol, and even iodine. Of all preparations of ichthyol two stand out pre-eminently—namely, *ichthoform* and *ichthargan*.

Ichthoform is an amorphous, brownish-black powder, being practically odourless and tasteless. It is insoluble in ordinary media such as water, alcohol and glycerin. When brought into contact with dilute alkalies it gradually splits up into its two components, ichthyol and formaldehyde, so that it is at the same time antiseptic and astringent. It is practically non-toxic. It is an excellent intestinal antiseptic. In infantile diarrhœa

it may be given in doses of 2 grs. in a little jelly. For children generally the dose ranges from 2 to 10 grs., given 3 times a day, concealed in milk, coca or gruel, or sandwiched between pieces of thin bread and butter. It is also valuable in the case of tuberculous lesions of the intestinal tract. Where diarrhœa is a prominent symptom it may be given in doses of 10–15 grs. thrice daily. Larger doses are said by Schaefer to occasion dryness of the throat, but as it is quite non-toxic, as much as 15 grs. per diem having been given without harm, this symptom is of little importance. Rectal injections of 40–50 grs. with starch mucilage are sometimes serviceable.

Polacco has given a short account of his experiences with ichthoform in the treatment of enteric fever. He employed doses of 8 grs. frequently repeated, so that in some cases the patients received as much as 96 grs. per day. This form of treatment was at times combined with ichthyol baths. 930 grs. of ichthyol were dissolved in a bath of hot water at a temperature of 95°F., and while the patient was in the bath this was reduced to 86° and even to 81·5°. The patient remained in the bath from 10 to 15 minutes, and all the time an ice-bag was kept to the head. This combined method of treating enteric fever resulted in a reduction of the patient's temperature and a diminution in the frequency of the pulse, while the respirations became fuller and deeper. Polacco's statistics for the year 1900–01 give a mortality of 5·4 per cent. under this treatment, whereas previously it had been as high as 22·22 per cent.

Ichthoform as a Dusting Powder. It is more particularly in cases of varicose ulcer that benefit has been obtained from this use of ichthoform. In many of these cases it has been used pure. Even foul discharging ulcers have healed under the simple free application of this powder. The fetor rapidly disappears and the astringent action of the remedy soon makes itself felt. It thus stimulates healing by formation of healthy tissue. For foul ulcers there is no more trustworthy remedy. Admixed with equal parts of boric acid, ichthoform will be found serviceable as a dusting powder for general use. Wherever there is a tendency to the formation of redundant granulation tissue during the process of wound-healing, the area should be freely covered with ichthoform and zinc oxide in equal parts. For hysidrosis nothing is so satisfactory as a powder composed of ichthoform, bismuth and starch.

As an ingredient in ointments ichthoform is of special

value. Time after time cases of chronic eczema have yielded to ointments into the composition of which ichthoform has entered. It may be used in strengths of from 1 to 5 per cent. with lanoline or vaseline as base. If used in too great strength it is apt to harden the skin and so delay the process of repair. It is of service not only in subacute and chronic eczema, but also in the impetiginous eczema so frequently met with in school children, in certain affections of the nails, and also in scabies.

Ichthoform gauze, used as a substitute for iodoform gauze for packing cavities, is most valuable. Thus for cavities left after removing tuberculous cervical glands or in cases of ischio-rectal abscess and fistula *in ano* nothing will be found so suitable and so efficacious as gauze thoroughly impregnated with ichthoform. It is a better and less expensive material than iodoform gauze.

Ichthoform is one of the most efficacious antiseptics which we at present possess, more especially in cases of intestinal disease, where its action is more certain and less harmful than salol and similar substances. It forms an excellent substitute for iodoform in all cases where the latter is indicated. It is odourless and practically non-toxic. For internal administration it is best given in small doses frequently repeated. Large single doses do not give the same satisfactory results and are more likely to produce untoward symptoms As much as 2 drachms may be given in one day if divided into small, frequently repeated doses.

Ichthargan is a brownish-black, amorphous powder, containing 28·7 per cent. of silver, and is quite odourless and tasteless. It is readily soluble in warm or cold water, in dilute alcohol, and in glycerin. It is, however, insoluble in absolute alcohol, in ether, and in chloroform. Its solutions are clear when freshly prepared, but become dark on exposure to light. It is relatively non-toxic. Solutions should always be prepared fresh with sterilized water and filtered.

Aufrecht has shown that ichthargan is more powerful than silver nitrate in its action on *streptococcus*, *staphylococcus pyogenes aureus*, on the bacilli of enteric fever and of diphtheria, and on gonococci; he also noted that ichthargan possessed greater penetrating powers.

Ichthargan in Gonorrhœal Urethritis. Much attention has been paid by Continental clinicians to the use of ichthargan in this somewhat troublesome affection, notably by Lohnstein, Fürst, Leistikow, Duhot, Goldberg, Rudolf and others.

The mode of treatment adopted is to prescribe an alkaline diuretic mixture combined with a little tincture of hyoscyamus, and to order morning and evening urethral injections of ichthargan in distilled water. The strength of solution employed varies from 1 in 5,000 to 1 in 500, according as the case is acute or chronic in its nature. It is always advisable to begin with comparatively weak solutions and gradually to increase the strength of the injection as the urethral mucous membrane becomes more tolerant. In the majority of acute cases cure is effected within 3 weeks, the injection being employed, as a rule, thrice daily. In chronic cases, perhaps more so than in any others, are ichthargan injections found very valuable. The strength used never exceeds 1 in 500, as this is found to be sufficiently energetic. Leistikow, however, mentions much stronger solutions, but these are found to cause the patient considerable suffering. They may have somewhat of a caustic action and so produce cicatricial contraction of the urethral canal. In the treatment of chronic urethritis bougies containing a small amount of ichthargan (say, a quarter of a grain) would probably be more advantageous even than injections, as they are not only more readily applied to the diseased parts but they are also more penetrating in their effects.

Ichthargan in Gynæcological Affections. The cases in which ichthargan has been employed were mostly those of leucorrhœa associated with a variety of conditions, such as pelvic cellulitis, endometritis, uterine retroflexion, and cervical catarrh. Pessaries containing half or one grain of active ingredient made into a mass with oil of theobroma were presented. One of these was placed in the posterior vaginal fornix every alternate night, and this was followed by boric acid douches next day aided by saline aperients. Improvement was always manifested even after the first or second pessary had been inserted and treatment rarely required to be continued for more than a few weeks. The milder cases were cured within a week ; the more severe cases necessitated assiduous application of the remedy for a month or 6 weeks. Instead of the pessaries a 10 per cent. solution of ichthargan in glycerin may be employed. Tampons of cotton wool are soaked in this and placed in the vagina. The indication for the use of ichthargan in gynæcological practice is the necessity for an astringent, plus an anti-inflammatory agent.

Ichthargan in Dermatological Practice. In the treatment of

skin diseases ichthargan will be found of service when employed in the form of ointments of varying strengths, from 0·5 to 5 per cent. in equal parts of lanoline and vaseline. The stronger ointments are apt to cause much burning where the skin is at all tender or raw, and for all ordinary cases a 1 or 2 per cent. ointment is quite powerful enough. The cases treated include tinea tonsurans, seborrhœic eczema, herpes zoster, ulcers, boils and a variety of minor skin affections. Boils, after being thoroughly treated by means of inunctions or a 10 per cent. ichthargan ointment, are very frequently aborted. Ringworm affecting the scalp also requires the application of a 5 or even a 10 per cent. ointment. Otherwise 1 per cent. ointment is the most generally useful.

Unna has recorded his experience of this remedy in cases of ulceration. He used it as a dusting powder in strengths of 1 and 5 per cent. diluted with talc. He combined this with zinc gelatin bandages and compresses and obtained good results. He states that ichthargan is a keratoplastic remedy, inducing the formation of new epithelium. His best results were obtained in old callous ulcers where the horny epithelium was first removed by the application of salicylic-creosote or salicylic-cannabis plaster mulls. He also observes that the antiseptic and keratoplastic properties of ichthargan suggest its use in cases of eczema, especially as it is met with on children's heads.

Ichthargan in Affections of the Throat and Nose. A 4 per cent. solution of ichthargan is the most generally serviceable means of employing the drug in rhino-laryngeal cases, since in stronger solutions it has a disagreeable taste and produces irritation. It is specially valuable in atrophic rhinitis, and as a pigment in tuberculous affections of the larynx and in chronic laryngitis.

Ichthargan in Eye Diseases. Guttmann finds ichthargan to be efficient in the form of a 1 in 200 ointment in congestive catarrh, although it is not better than the older remedies. It is very useful in purulent cases of the lachrymal sac ; it is one of the best remedies for the medical treatment of pannus. M. Falta states that recent cases of trachoma are completely cured by ichthargan in 6 or 8 weeks. The 0·5 per cent. solution was first used, followed by a 0·3 per cent. solution ; this was brushed over the affected part.

Internally, ichthargan may be safely given in solutions containing $\frac{1}{2}$ gr. to 2 grs. in 8 oz. of water, of which a teaspoonful may be taken 3 times a day. It is useful in promoting the

healing of gastric ulcer. Its employment as an enema in dysentery is suggested. (See also *Year-Book*, **1902, 183,** 184; **1903,** 284.)

Iodylin. (*Merck's Report*, **17,** 116.) Iodylin, or iodosalicylate of bismuth, is a fine powder of a light-grey colour. It keeps well, and, being odourless, innocuous and non-irritant, has been recommended by Frieser as a substitute for iodoform. It possesses in a marked degree the power of diminishing secretion, promoting granulation, and exercises a favourable influence upon cicatrization, but does not give rise to irritation or rashes. Iodylin is employed in the form of a powder for dusting and insufflating, also as an ointment. Iodylin gauze has been employed by Israel for the treatment of wounds with satisfactory results.

Iothion. (*Pharm. Centr.*, **45,** 457.) This combination of iodine, sulphur and sesame oil is prepared in two strengths, one containing 10 per cent. of iodine and 1·6 per cent. of sulphur; the other, 25 per cent. of iodine and 2·5 per cent. of sulphur. It is a yellowish-brown, syrupy liquid, heavier than water, and is intended for internal and hypodermic use.

Ipomæa orizabensis, Mexican Scammony Root. E. M. Holmes. (*Pharm. Journ.* [4], **18,** 326) and H. Deane (*ibid.*, 327.) The root, sent from Hamburg for identification under the name of Mexican scammony root, proved to be undoubtedly the root of *Ipomæa orizabensis*, described in *Pharmacographia* as light, fusiform, or woody jalap (male jalap), orizaba root, and jalap tops or stalks, the Mexican name being *Purgo macho*. The root seems to occur rarely in the English market, since it has not been met with during the last thirty years. The appearance of the root is very characteristic and quite different from that of scammony root. It occurs mostly in transverse slices, showing concentric rings, from which coarse fibres protrude on both of the transverse surfaces. The sections are mostly those of the larger portion of the root, and vary from 2 to 3 ins. or more in diameter, but are only about $\frac{1}{2}$ inch to $\frac{3}{4}$ inch in thickness. The smaller roots are about 1 inch or so in diameter, but are frequently 3 or 4 inches long; a few pieces are obliquely cut. The concentric arrangement of the vascular bundles at once distinguishes it from the root of *Convolvulus scammonia*, in which they are scattered and somewhat rounded, forming islands, as it were, in the sofrer

tissue. The specimen sent to the Museum had been received from Hamburg with the following information: "The sample we send is scammony root. It is a new production from Mexico, and German makers have bought large lots of this kind, and have entirely given up using the Levant root, since the Mexican root contains a higher percentage of resin, usually 15·5, against 8·9 per cent. in the Levant root. During 1903 there was an importation of over 3,000 bags, which readily sold to the makers. The analyses made in 1903 were between 6·4 and 22·2 per cent. of resin, but only three of the analyzed lots had a percentage of 6·4, 6·6, and 7·3 per cent. All the other lots had about 17 per cent. of resin." It is interesting to note that for some months past scammony resin of German manufacture has been offered at a price at which it could not be manufactured in this country from the genuine root. It may, indeed, be taken as an axiom that any unaccountable fall in the price of any drug necessitates a certain amount of caution in buying, and careful investigation of the reason of the low price. Chemically, there appears to be no difference between the resin of scammony and the resin of *Ipomœa orizabensis*, but it still remains to be ascertained if they are identical in their physiological action.

Examining the above specimen, H. Deane found it to contain 18·5 per cent. of resin. The dried resin was pale brown, and almost entirely soluble in ether, the insoluble portion from 18·5 Gm. weighing less than 0·25 Gm. It had the general characters of scammony resin. Poleck (*Zeits. d. allg. Oesterr. Ap. Ver.*, **1892,** 451) has shown that the purified resin, which he terms jalapin, and others orizabin, is identical with that obtained from scammony root. As scammony root yields only 5 or 6 per cent. of resin, the preference of manufacturers for the root of *Ipomœa orizabensis* is readily explained.

The powdered drug, dried at 100°C., yielded 9·89 per cent. of ash.

Jaborandi Alkaloids, Physiological Action of. C. R. Marshall. (*Journ. Physiol.*, through *Pharm. Journ.* [4], **18,** 827.) Jaborandi leaves contain three alkaloids—pilocarpine, iso-pilocarpine, and pilocarpidine. Iso-pilocarpine only occurs in small quantity. Pilocarpidine only in small amounts in *Pilocarpus jaborandi*, Holmes (Jowett).

No substance corresponding to jaborine has been found in the leaves either chemically (Jowett) or physiologically; but a sub-

stance possessing an atropine-like action is present in the jaborine of Merck, which, however, consists mainly of pilocarpine or iso-pilocarpine.

Pilocarpine acts upon the so-called nerve-endings in the heart, and its action is comparable in nearly all points with that obtained by electrical stimulation of the vagi.

Small doses of pilocarpine increase the sensitiveness of the vagus to electrical stimulation. Large doses, if injected during electrical stimulation of the vagus, are practically without action.

A small dose of atropine is able to counteract for a definite time an excessive amount of pilocarpine. With efficient doses a proportion of 1 of atropine in 40 of pilocarpine can be demonstrated; with large doses 1 of atropine in over 1,000 pilocarpine can be detected.

The antagonism of pilocarpine and atropine is physiological.

Iso-pilocarpine acts like a weak pilocarpine. In efficient doses it is about 6 times weaker. In large doses it is at least 20 times weaker.

Pilocarpidine acts like iso-pilocarpine, but is much weaker.

The homo-pilopic portion of the pilocarpine molecule acts at least as an interacting or haptophore group. Solutions containing the hyproxyacid corresponding to the lactone-pilocarpine are inactive. The influence of the glyoxaline part of the molecule has not yet been determined.

Jaborandi, Guadeloupe. E. M. Holmes. (*Pharm. Journ.* [4], **18,** 54.) Discrepant statements having appeared as to the alkaloidal value of Guadeloupe jaborandi leaves, a specimen was submitted to A. J. Cownley, who found them to yield 0·6 per cent. of total alkaloids, which give about 50 per cent. of a crystalline nitrate melting at 155°C. According to Jowett, pure pilocarpine nitrate has a m.p. of 178°C., and anhydrous isopilocarpine nitrate of 159°C. It would seem, therefore, that the nitrate probably consists largely of isopilocarpine nitrate, or possibly of some other alkaloid. Isopilocarpine is estimated by Marshall to be only 1/8 to 1/10 of the strength of pilocarpine, physiologically (*vide supra*).

Further experiments as to the physiological action of the alkaloids of Guadeloupe jaborandi are therefore necessary, when larger supplies can be obtained, before it is certain that these leaves can be used as a source of pilocarpine nitrate. At present the pilocarpine nitrate of commerce is obtained chiefly from the

leaves of *Pilocarpus microphyllus*, so far as can be judged from the imports. The demand for these leaves is already considerable, orders for 5 or 10 tons being placed at one time.

The discrepancy in the results obtained as to percentage of alkaloid in Guadeloupe jaborandi leaves may possibly be due to the leaves having been collected at different periods of the year. (See also p. 233.)

Lithium Agaricate. (*Merck's Report*, **17,** 16.) Lithium agaricate has been employed with success by H. Schneider in suppressing the night sweats of phthisis, in doses of $1\frac{1}{2}$–3 grs. given twice, first about 8 p.m., then again at 9 p.m. It is soluble in water, giving a somewhat turbid solution with a saline taste.

Lithium Arrhenal, Lithium Chlorhydromethyl-Arsinate. Labadie Lagrave. (*Bull. Méd.*, through *Nouv. Remèdes*, **19,** 537.) Good results have been obtained in the treatment of diabetes with the lithium compound of chlorhydro-methyl-arsinic acid, CH_3AsHO_2HCl, which is thus prepared: Methyl-arsinic acid is dissolved in hydrochloric acid; on evaporating and cooling, chlorhydro-methyl-arsinic acid separates out in crystals which dissolve with great facility in water without decomposing. This aqueous solution is neutralized with lithia, and the lithium compound obtained, after evaporation, in extremely deliquescent crystals, which have the constitution $CH_3AsHCl\langle^{LiO}_{LiO}_{O}$. It has been given in diabetes in doses of 5–10 drops of a solution containing 0·04 Gm. of chlorhydro-methyl arsinic acid and 0·15 Gm. of lithia. It may also be given in the form of pills, each containing 0·02 Gm. of the acid, and 0·075 Gm. of lithia, one of which is to be taken twice a day with food. It is stated that the salts of chlorhydro-methyl-arsinates are more stable than either the cacodylates or the methylarsinates.

Lithium Benzoate in Gouty Corneal Opacity. —Mazet. (*Bull. Gen. de Thérap.*, **146,** 537.) From its solvent action on urates, phosphates, and carbonates, to the deposit of which opacity and keratitis of the cornea is often due in the case of gouty subjects, a solution of 2·5–10 per cent. of lithium

benzoate has been found of service. Several drops of a solution of the above strength are dropped into the eye twice or thrice daily. The application is said to be entirely harmless and unattended by any inconvenience to the patient, while the opacity caused by the deposits is removed.

Lithium Salts, Toxicity of. —Good. (*Amer. Journ. Med. Sci.*, through *Nouv. Remèdes*, **19**, 354.) A note of warning is sounded against the indiscriminate administration of lithium salts, which are stated to be decidedly toxic. Cats treated hypodermically with 15–30 grs. of LiCl succumbed to acute gastro-enteritis. *Post-mortem* appearances all pointed to the fact that death was due to an irritant poison. Further investigation showed that lithium salts, when taken in a non-toxic dose, are eliminated but slowly and ineffectually by the kidneys; the metal could be detected several weeks after the taking of the dose. The salts are practically devoid of any diuretic action, nor do they, in the dilute state in which they occur when administered in medicinal doses, exert any solvent action on uric acid or its salts.

Lygosine and Sodium Lygosinate. J. Orient. (*Journ. Pharm. Chim.* [6], **18**, 34, after *Pharm. Post.*) Di-sodium di-ortho-coumaric ketone,

$$\begin{matrix} NaO-C_6H_4-CH = CH \\ NaO-C_6H_4-CH = CH \end{matrix} \Big\rangle CO,$$

known as sodium lygosinate, is obtained as a condensation product of acetone and salicylic aldehyde in the presence of caustic soda,

$$2(HO.C_6H_4.CHO) + CH_3.CO.CH_3 + 2NaOH = \begin{matrix} NaO-C_6H_4-CH = CH \\ NaO-C_6H_4-CH = CH \end{matrix} \Big\rangle CO + 2H_2O.$$

It forms green prismatic crystals with a metallic lustre which contain 7 mols. H_2O. It is washed with alcohol 90 per cent., and purified by recrystallization from alcohol 60 per cent. It is soluble to the extent of 6 : 100 of water at 18·4°C. The solution is red and faintly alkaline. It is sparingly soluble in alcohol; in glycerin to the extent of 14 : 100. Dilute acids give a yellow crystalline deposit of lygosin or diorthocoumaric ketone.

Sodium lygosinate is a powerful antiseptic, and is used locally in the treatment of gonorrhœa. The commercial preparation often contains the monosodium compound as an impurity, derived from the action of atmospheric CO_2 during its preparation. The absence of this salt may be determined from the amount of Na_2CO_3 given after incineration.

Lygosine Quinine, a New Application for Suppurating Wounds and for Epistaxis. J. Szendrö. (*Wiener Med. Woch.*, through *Nouv. Remèdes*, **19,** 538.) This compound, the quinine salt of diorthoxydibenzolketone,

$$C_6H_4 \begin{matrix} O(HC_{20}H_{24}N_2O_2)(C_{20}H_{24}N_2O_2H)O \\ CH = CH-CO-CH = CH \end{matrix} C_6H_6,$$

is a bright-red, odourless, amorphous powder. Applied to various suppurating lesions, boils, carbuncles, eczema, burns, and venereal ulcers, either as a dusting powder or in the form of a medicated gauze, it speedily arrests purulent discharge and brings about healing of the wound. It gives rise to no unfavourable symptoms even when applied with freedom. In addition to its antiseptic action, it is a powerful styptic, quinine lygosine gauze having proved a prompt and efficient means of arresting bleeding in epistaxis.

Lysargine. (*L'Union Pharm.*, **44,** 494.) Lysargine is a form of colloidal silver containing 60 per cent. Ag. It is readily soluble in water, and occurs in tufts of a metallic aspect.

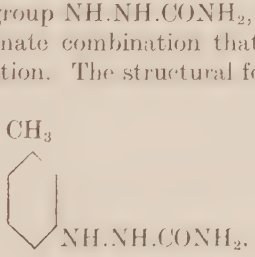
Male Fern, Fluid Extract of, Activity of. — Nagel. (*Merck's Report*, **17,** 70.) The activity of male fern extract as an anthelmintic depends entirely on the age of the drug employed in its preparation. Only when the fresh drug of the last season's growth is used are satisfactory results obtained. The use of castor oil as an aperient in conjunction with the extract should be avoided; calomel is preferable. When symptoms of toxic action appear, due to personal iodosyncrasy on the administration of large doses, they may be counteracted by the use of phenacetin or salipyrine in 15-grain doses.

Mangifera indica, Gum of. P. Lemelaud. (*Journ. Pharm. Chim.* [6], **19,** 584.) Mango gum is frequently met with in the bazaars, where it is known under various vernacular names, such as "Aub-ki-gond," "Amba-Nu-Gundar," and

"Amba Melleiyum." It occurs in dark-coloured masses varying in tint from amber to reddish-yellow, translucent, almost transparent, in pieces varying in size from that of a nut to that of a hen's egg, rounded or lobed. Internally they are much less fissured than gum acacia. They are mixed with particles of red-brown bark, penetrating more or less deeply into the pieces, with fragments of bright green leaves adhering to the surface of the gum. The fracture is brilliant and conchoidal.

The sample examined contained 16·57 per cent. of moisture. It was partially soluble in water, the insoluble portion swelling to a thick viscous mucilage which would not filter. About 39·36 per cent., calculated on the dry gum, was dissolved. This solution was lævogyre; $[\alpha]_D$ −25° 33′. The gum was wholly insoluble in alcohol 90 per cent. It contained an oxydase, similar to gum acacia. It yielded 4·005 per cent. of ash, which is rich in lime. After hydrolysis with dilute H_2SO_4 it yielded 85·6 per cent. of reducing sugars, consisting of 30·36 per cent. of galactose, 42·065 of pentoses and arabinose. The portion of the gum insoluble in water contained similar constituents.

Maretin. J. Barjansky. (*Apoth. Zeit.*, **19,** 434.) A new antithermic, described as a "non-toxic antifebrin," has been introduced under the above name for the treatment of fevers and phthisis. It is a methylated acetanilide in which the acetyl group is substituted by the group $NH.NH.CONH_2$, in which the urea nucleus is in such intimate combination that it does not split off aniline on decomposition. The structural formula of the new body is



It is a white, glittering, crystalline, tasteless body, soluble only to the extent of 1 : 1,050 in water. It melts at 183·184°C. It is given in doses of 3½ grs. in the form of a powder, which may be repeated twice daily. It is a perfectly safe antipyretic, and its action is not so sudden as that of pyramidon. In no case have any ill-effects on the kidneys been observed to follow its use, nor does it occasion collapse. The fall in temperature is accompanied by a more or less profuse perspiration.

Menthyl Glycolate. (*Nouv. Remèdes*, **19**, 225.) This new ester, $CH_2\begin{cases}OH\\COOC_{10}H_{19},\end{cases}$ is a tasteless non-irritant body, possessing the therapeutic properties of menthol. It has the advantage over the other menthol esters of being completely split up by the alkaline intestinal secretion. It has proved eminently serviceable in the treatment of gastric disturbances, nausea, vomiting, and other digestive troubles.

Mercury Cacodylate. (*Merck's Report*, **17**, 7.) This preparation has been employed by G. Giuffo in syphilis in the form of 2·5 per cent. sometimes even 5 per cent. solutions, administered subcutaneously, a syringeful being injected every day during a period of 15–30 days, with the exception of one day per week. This treatment has furnished very satisfactory results, unattended by objectionable secondary effects.

A new mercuric cacodylate with the formula

$$As\begin{cases}(CH_3)_2\\-O\\ONH_2Hg\end{cases}$$

has been described by L. Jullien and F. Berlioz as a greyish-white powder containing 56 per cent. of mercury and very freely soluble in water. Both authors employ this preparation in syphilis in the form of injections of $\frac{1}{6}$–$\frac{1}{3}$ grain.

Mercury Iodo-Cacodylate. G. Loewenbach. (*Merck's Report*, **17**, 8.) Iodo-mercuric cacodylate is a limpid fluid, which is prepared as follows: Mercuric oxide is heated in the presence of an excess of cacodylic acid and of the resulting white crystalline mercuric cacodylate 15 grs. is dissolved in 30 grs. cacodylic acid and $2\frac{1}{2}$ oz. distilled water. This solution is mixed with 15 grs. of sodium iodide dissolved in 75 grs. water neutralized with caustic soda. It should then be made up to 3 fl. oz., 160 m, and filtered. The iodo-mercuric cacodylate so obtained keeps for weeks, and may be sterilized at temperatures of 100–120°C.; 1 c.c. of the preparation contains $\frac{1}{13}$ gr. of mercuric iodide and $\frac{1}{2}$ gr. sodium cacodylate. The preparation was employed for intramuscular injections within the gluteal region in doses of 1 c.c., since when given internally by the mouth it occasions diarrhœa.

Methylaspirine. (*Annales de Pharm.*, **9,** 301.) Methylaspirine is the methyl ester of acetyl-salicylic acid. It has been prescribed in rheumatism in doses of 75–95 grs. in 24 hours. It occurs in crystals which are soluble in water, and which melt at about 48°C. It is decomposed by boiling water into methyl salicylate and acetic acid.

Myrrh, Reagent for. E. Hirschsohn. (*Pharm. Zeit.*, **48,** 96.) Trichloracetal-chloral hydrate is recommended as the best reagent for myrrh. The reagent is prepared by passing chlorine gas into alcohol 75 per cent., if possible in direct sunlight, until the liquid becomes cloudy, and separates, on standing, into two layers. The lower of these is separated, washed with water, and freed from acid by calcined magnesia. It is then filtered and mixed with four times its weight of chloral hydrate. The resulting syrupy liquid fumes slightly, and gives with genuine myrrh a fine violet coloration. As far as the author's experience goes, no other resin or gum resin gives a similar coloration.

Narcyl. (*L'Union Pharm.*, **1904,** 4.) Under this name ethyl narceine hydrochloride has been introduced as a sedative and anti-spasmodic for the treatment of cough and allaying pain. It occurs in brilliant prismatic crystals; m.p. 205–206°C. It is soluble in water to the extent of 1 : 120 at ordinary temperatures, but the solubility is increased by the addition of salts of benzoic, citric, or cinnamic acids. The dose is 1 gr. in 24 hours, taken internally, or $\frac{1}{3}$ gr. by hypodermic injection.

Neuronal. (*Deutsch. Med. Woch.*, through *Pharm. Centr.*, **45,** 437.) Bromodiethylacetamide has been introduced as a sedative hypnotic under this name. It is stated to be free from any ill-effects on the kidneys, and is advocated for trial in the treatment of epilepsy.

Nicotine, Caffeine as an Antidote for. —Zalakas. (*Med. Blat.*, through *Nat. Drugg.*, **34,** 40.) From the result obtained on rabbits, in which the administration of caffeine by intravenous injection rendered harmless a previously injected lethal dose of nicotine, it is considered probable that caffeine would prove an efficient antidote in cases of nicotine poisoning in the human subject.

Nutmeg and Mace, Carbohydrates in. A. Brachin. (*Journ. Pharm. Chim.* [6], **18,** 16.) Nutmegs contain starch and saccharose to the extent of 0·56 per cent. Mace contains no saccharose

and a pectin. The latter has a very high dextro-rotation +240°. It contains approximately the same amount of galactanes as the pectins described by Bourquelot and Hérissey.

Oatmeal in Diabetes. C. von Noorden. (*Berlin Klin. Woch.*, through *Bull. Gén. de Therap.*, **146,** 794.) An exclusive regimen of soup or porridge composed of oatmeal, 5, albumin, 2, butter, 6, is claimed to effect a cure in cases of diabetes. The use of a little cognac, wine, or strong coffee may also be permitted. After a few days of treatment, sugar and acetone disappear completely from the urine; after a time the patient is able to gradually resume a more mixed diet without harm.

Peppermint, Early History of, and Modern Commercial Development. A. M. Todd. (*Proc. Amer. Pharm. Assoc.*, **51,** 271.) An able historical article is given, which, not lending itself to abstraction, should be consulted in the original.

Pilocarpine, Comparison of Physiological Properties with 1 : 4 (or 1 : 5)-Dimethylglyoxaline and 1 : 3-Dimethylpyrazole. H. A. D. Jowett and C. E. Potter. (*Proc. Chem. Soc.*, **19,** 56.) These bases were prepared in order to compare their reactions with those of iospilocarpine.

1 : 4 (or 1: 5)-Dimethylglyoxaline, obtained from 4 or 5-methylglyoxaline (hitherto described as a liquid, but now obtained in crystals, m.p. 55°C.), is an oil boiling at 203°C., and forming an aurichloride, m.p. 215°C.; platinichloride, m.p. 239°C.; picrate, m.p. 167°C.; methiodide, m.p. 156°C.; and hydrochloride, m.p. 145°C. Bromine gave a crystalline dibromo-derivative, m.p. 127°C., but at 100°C. under pressure the reaction was complicated, and a crystalline acid was produced. On oxidation, the base yielded ammonia, methylamine, and acetic acid, whilst by the action of potassium hydroxide the methiodide gave methylamine and acetic acid.

1 : 3-Dimethylpyrazole, prepared from 3-methylpyrazole, is a liquid boiling at 148°C., which gives an aurichloride, m.p. 175°C.; platinichloride, m.p. 234°C.; hydrochloride, m.p. 160°C.; and methiodide, m.p. 256°C. Bromine under ordinary conditions, or at 100°C. under pressure, gave a dibromo-derivative, m.p. 74°C.; 1-methylpyrazole-3-carboxylic acid, m.p. 222°C., was obtained by oxidation of the base. The methiodide was scarcely attacked by potassium hydroxide.

1 : 2-Dimethylglyoxaline forms a picrate, m.p. 179°C.; an

aurichloride, m.p. 215°C. ; a platinichloride, m.p. 230°C. ; and a methiodide which does not melt below 300°C.

C. R. Marshall states that these bases have no physiological action analogous to that of pilocarpine.

Pilocarpus racemosus, Guadeloupe Jaborandi. E. M. Holmes. (*Pharm. Journ.* [4], **17,** 713.) A new variety of jaborandi, derived from *Pilocarpus racemosus*, has recently (November, 1903) appeared on the London market. In size the leaves are broader in proportion than those of Pernambuco jaborandi, and have the lateral veins similarly prominent on the upper surface, but they are as a rule more obovate in outline, and when they approach in shape those of the official drug, they are always larger and broader. The colour is a purer green without the brownish tint so frequent in the leaflets of *P. jaborandi*. *Pilocarpus racemosus* is the only species, except *P. heterophyllus*, which has simple as well as trifoliate leaves, i.e., leaves in which the usually trifoliate leaves are reduced to a single leaflet near the top of the shoots ; but in the latter species the leaves are much smaller and different in shape, being narrowly elliptical. G. Rocher has found the leaves to yield 1 per cent. of alkaloids similar to the total alkaloids of *P. jaborandi*, but the present parcel were found to contain only 0·34 per cent.

Podophyllin. D. B. Dott. (*Pharm. Journ.* [4], **18,** 84.) The resin of Indian *Podophyllum* being official in the Colonial Appendix, there is no reason why it should not be official in our own country, if it be really true that it is equal in value to the resin of *Podophyllum peltatum*.

In a brief note read last year it was suggested that the subject still required investigation, both on the chemical and pharmacological sides. A letter thereon was sent to the *Chemist and Druggist* (*April* 18, **1903,** 630), by T. A. Henry, who, along with Dunstan, made an able and elaborate investigation of the subject (*Journ. Chem. Soc.*, **1898,** 209). In this letter it is suggested that the difference between the two resins is due to the fact that " the Indian resin contains from one and a half to three times as much podophyllotoxin as the American resin," and that Mackenzie (*Edinburgh Medical Journal, Nov.*, **1898,** 393) has demonstrated " the greater activity of the Indian product." As podophyllotoxin is the chief active principle of the resin, one would expect from the above that the Indian resin would possess a far more powerful purgative action than the American. But

the bulk of evidence is quite against that conclusion. In the *Year-Book of Pharmacy* for **1903** (page 232), J. O. Braithwaite mentions three cases in which gradually increased doses of the *P. emodi* resin produced no effect, even when amounting to 3 grs. In view of such statements it can hardly be contended that we are yet in a position to substitute the resin of *P. emodi* for that of *P. peltatum*. Even if it were proved that the resin had become altered in the process of extraction, that would be a reason against adopting it, as we do not find any such susceptibility in the case of the American resin.

Notwithstanding the Dunstan and Henry investigation, the chemistry of the subject does not appear to have been completely elucidated. If the difference between the two resins were simply one of the degree mentioned, we should not expect to find the insoluble matter left by treating the *peltatum* resin with dilute ammonia solution to amount to 5–12 per cent., and that of the *emodi* resin in same conditions to amount to 50–60 per cent. The Indian resin has been described as "gelatinizing" when treated with ammonia. No one would think of applying that expression in the case of the ordinary resin.

With reference to Dunstan and Henry's paper one observes, in the first place, that the specific rotation of the hydrated podophyllotoxin is given as $-94^\circ\ 48'$, while that of the anhydrous compound is stated as $-78^\circ\ 4'$. That may be correct, but possibly some other change than mere dehydration had taken place. The proof of isomerism is not so conclusive as it might be. While the combustion of podophyllotoxin gives numbers agreeing fairly well with the formula $C_{15}H_{14}O_6$, the figures found for picropodophyllin agree better with $C_{15}H_{16}O_6$. The methoxyl numbers, 20·66 and 21·56 respectively, agree only fairly well; whilst the bromine determinations, 20·9 and 18·85, are considerably different. As to the remark that even one methyl group makes a considerable difference, it does not seem at all likely that a change which is effected by the action of dilute ammonia in the cold would consist in the elimination of the methyl. The first thing that occurs as likely to result by the action of alkali is some form of hydrolysis, and if the molecule is complex, as it probably is, we have hardly yet sufficient evidence that no such change has occurred. If the compounds as analyzed were both anhydrous, and are found to give the same percentages of carbon, oxygen, and hydrogen, the effect of ammonia must be a polymerizing action. The evidence for the

existence of podophyllic acid is by no means conclusive. It seems to be nothing more than picropodophyllin in solution or combination. The statement that "the nature of the isomerism of podophyllotoxin and picropodophyllin is at present obscure" is evidently correct. As to the method adopted for estimating podophyllotoxin, by percolating the rhizome mixed with lime, etc., so as to obtain picropodophyllin, it can only be correct if it has been established that all the picropodophyllin finally obtained is the direct equivalent of a corresponding amount of podophyllotoxin; that is to say, that none of the picropodophyllin has previously existed as such, or has been derived from any other source than podophyllotoxin. This assumption seems more than is warranted by the published experimental data.

Podophyllum Resin. H. J. Lohmann. (*Proc. Amer. Pharm. Assoc.*, **51,** 317.) The greenish yellow resin of the U.S.P. description, most frequently met with in American pharmacy, does not respond to the U.S.P. tests. The resin prepared strictly according to the U.S.P. directions is of a light brown colour, and darkens on exposure to the air, especially in the presence of moisture.

It is found that by precipitating the alcoholic extract of the root (1) with water only, (2) with water acidified with HCl, and (3) with water containing HCl and 5 per cent. of alum, widely different results were obtained.

By process No. 1 two different parcels of root gave respectively 4·09 and 3·1 per cent. of resin, which was nearly white in colour. It was extremely active; $\frac{1}{150}$ gr. in one case occasioned violent intestinal pain and convulsions.

By process No. 2 the yield was 9·93 and 7·09 per cent. of light brown resin, which could be given in doses of $\frac{1}{4}$–$\frac{1}{2}$ gr.

Process No. 3 gave 15·0 and 14·3 per cent. of resin, which was greenish yellow in colour and could be given in doses of 1–2 grs.

Roots collected before blossoming and seasoned two years gives the best yield of resin, the percentage by process No. 1 being 4·26; by No. 2 process, 10·3; and by No. 3 process, 19·29 per cent. The commercial drug is collected throughout the year, and is most probably unseasoned.

The products of processes Nos. 1 and 2 are soluble in alcohol and ether in all proportions, but the resin of process No. 3 is only soluble to the extent of 85 per cent., leaving a white residue. The first two resins fuse nearly completely in boiling water and

reprecipitate on cooling, but that of process No. 3 loses 15 per cent. of its weight by the treatment.

The resins of Nos. 1 and 2 processes are completely soluble in KOH and NaOH, and are reprecipitated by acids, leaving a brown coloured solution. The product of process No. 3 is incompletely soluble in alkalies, leaving a gelatinous residue; after reprecipitating with acid the resin is brown and the supernatant liquid yellow.

It is evident that the method of precipitation greatly modifies the nature of the resin.

Inasmuch as the resin is not found in the fresh drug, and is apparently developed by reaction among the constituents during seasoning for two years, and that the drug collected before blossoming affords the highest yield, it would be well for these conditions to be officially specified. Since the greenish yellow, or yellowish-green resin of podophyllum does not comply with the tests prescribed in the U.S.P., these descriptive terms should be deleted from the official description.

Prosopis (Mezquit) Gum. E. G. Eberle. (*Proc. Amer. Pharm. Assoc.*, **51,** 201.) Three varieties of mezquit, *Prosopis juliflora, P. pubescens* and *P. cinerascens,* which occur in Texas, yield a gum which, although not white, being amber coloured to brown, gives a good mucilage and forms excellent emulsions. It is not precipitated with basic lead acetate, with borax, or ferric chloride. It contains 84 per cent. of arabin. It is stated to be useful for confectionery. Besides this gum, the mezquit yields a dark inspissated juice which contains 15-22 per cent. of tannin.

Pyrenol or Pyrane. (*Pharm. Post*, **37,** 310.) Benzoyl-thymyl-sodium benzoyloxybenzoate, a white crystalline powder having a sweetish taste and a slight aromatic odour, has been introduced as an antispasmodic. It is given in bronchial asthma in doses of 15 grs., 3 times a day; in small doses it acts as an antispasmodic expectorant in whooping cough. It has also been found to be serviceable in angina and in cardiac affections in doses of 7–10 grs.

Quinaphenine. (*Merck's Report*, **17,** 45.) Quinaphenine, or quino-carbonic-phenetidide,

$$CO\begin{cases} NH.C_6H_4.OC_2H_5 \\ OC_{20}H_{23}N_2O, \end{cases}$$

is a white tasteless powder which dissolves sparingly in water but freely in alcohol, ether and chloroform. It is indicated in pertussis of infants and in neuralgia, and in sciatica diabetica. In whooping cough, infants should be given 2½–3 grs., older children 3–5 grs., 3 times a day in milk, soup, or in chocolate tablets. It is taken readily, and diminishes both the frequency and the intensity of the attacks. As a remedy for neuralgia it is said to be superior to quinine, and as an antipyretic, in doses of 24–30 grs., it induces a general decrease of the temperature.

Quiniform. G. Bardet. (*Bull. Gén. de Therapeut.*, **146**, 110.) Hexamethylene-tetramine quinate has been introduced as a uric acid eliminant. It is perfectly soluble in water, and may be taken in continued large doses, since it is absolutely devoid of toxicity. In addition to its action in eliminating uric acid from the system, it also exerts a marked antiseptic action on the bladder. The dose of 30–60 grs. per diem is sufficient to obtain the best results, which may be described as a kind of uric acid purge, since the quinic acid causes a very considerable emission of hippuric acid, while the urates are removed as the soluble compounds of hexamethylene-tetramine. It is not until the patient has been under treatment for some days that the amount of uric acid eliminated falls to a normal, or subnormal figure. Quinoform gives the best results in gout, when given in conjunction with a dietetic regimen. It is taken in cachets or simply dissolved in water.

Radium, Therapeutic Application of. (*Merck's Report*, **17**, 154.) Increasing interest is shown in the therapeutic application of radium. Treatment by radiation has yielded good results in subcutaneous metastasis and incurable carcinoma. In psoriasis vulgaris it has also been seen to induce the disappearance of squamous infiltration and the detachment of the scales, following a comparatively short exposure. In the case of lupus an exposure to radium bromide of no greater duration than 3–5 minutes suffices to induce the shrinkage of the tissue to its normal condition. Good results were likewise obtained with patients suffering from epithelioma of the skin, where the inflammation of the healthy skin, which forms an invariable side issue of the treatment, took a typical course. It is interesting to note the cure of flat telangiectasis, as described by Holzknecht, a result which may be regarded as the outcome of the dermatitis arising from the action of radium. In order that deep-seated

pathological processes may be brought within the influence of radium without injuring the skin, Strebel has devised a method of intratumoral application. For this purpose the radium is placed into the hollow point of a small aluminium rod and this point is thrust into the tumour. This excludes from the influence of the radium all but the affected parts.

Strebel has attempted to utilize the radio-activity induced in other substances for clinical application, such as water rendered radioactive, as a means for the treatment of cancer of the stomach. F. Soddy claims even to have obtained successes by treating tuberculosis of the lungs by causing the patient to inhale the emanation of the aqueous solution of a radium salt. Caspari finds that the results of the injection of radium solutions are negative. Although radium emanation has undoubted inhibitory action on bacteria, its application in practical medicine as an antiseptic or germicide is impossible on account of the destructive effects of the rays on the tissues. E. S. London has claimed that the approximation of radium bromide to the eyes of the blind renders them slightly sensitive to light, and in some cases to a certain degree restores vision ; but this is contradicted by many other experimenters.

Rheumasan. (*Merck's Report*, **17**, 157.) Rheumasan is a superfatted soap-cream containing 10 per cent. of uncombined salicylic acid. It has a pleasant odour, keeps for an indefinite period, and is clean in its clinical application. Since it is readily absorbed by the skin, the salicylic acid reaches the lymph passages of the body, whereby a much more exact action is obtained than that resulting from the internal administration of a much larger quantity of the acid or its compounds. The same effect is accordingly obtainable by the external application of salicylic acid in the form of rheumasan, which does away with the necessity of its internal administration, with all its attendant objectionable features.

After cleansing the affected parts of the body, rheumasan is applied in a thin layer in quantities of 75–150 grs., and the area treated covered with a thin layer of wadding. After 12 hours the dressing is removed, and the application renewed, after washing off that first applied. Rheumasan does not give rise to any unpleasant symptoms.

Salibromin (*Pharm. Centr.*, **44**, 480), $C_6H_6Br_2 \begin{cases} COOCH_3 \\ OH, \end{cases}$

is a white, unctuous, tasteless powder, with a faint odour. It is insoluble in water and in acids, but dissolves in alkalies. It contains 44·5 per cent. of salicylic acid and 51·6 per cent. of combined bromine. It is given in rheumatism and fevers in doses of 30–75 grs. in 24 hours.

Salite. P. Mueller. (*Muench Med. Woch.*, through *Pharm. Centr.*, **45,** 321.) The name salite has been applied to bornyl salicylate, $C_{10}H_{17}OCOC_6H_4OH$, which has been introduced as a substitute for methyl salicylate as a local application for rheumatism. The oily fluid is readily soluble in olive oil, which is generally used as the vehicle, for application, a 50 per cent. solution being used, which is applied as a pigment or inunction in doses of half to one teaspoonful twice daily, the parts being afterwards enveloped in wool. Its odour is slighter than that of mesotan.

Salocreol. (*Merck's Report,* **17,** 159.) This is the salicylic ester of the mixed phenols of beechwood creosote. It is used as a local application for rheumatism, and erysipelas. Before applying the remedy, the skin should be carefully dried, and the salocreol either painted on or rubbed in. The dose thus used is from 90 to 300 grs.

Sanoform, a Substitute for Iodoform. G. Bamberg. (*Berl. klin. Woch.*, through *B.M.J. Epit.* [2], **1903,** 87.) In reporting on the new iodoform substitute, sanoform, first produced by Gallinek and Courant, which is a di-iodsalicylate methyl ester, having the formula $C_6H_2.OH:I_2.COOCH_3$, it is described as a white, tasteless, and odourless powder which is not decomposed by light. It contains 62·7 per cent. of iodine. It melts at 110·5°C., but on cooling again solidifies into unaltered sanoform. It is only decomposed by a temperature of 200°C. When brought into contact with the living tissue it is very slowly dissolved, and free iodine and salicylic acid are liberated in traces. Both these bodies act in a nascent state as powerful bactericides. In testing its action on bacteria it was found that sanoform exerted an inhibitory action which was not less marked than that of iodoform. In testing the preparation in practice both the powder and a sterilized sanoform gauze were used. Two-thirds of the 225 cases in which it was used were vaginal operations, and in the case of abdominal operations the wounds were covered with powder and over that a layer of

gauze was placed. In no case were any ill-effects observed ; the wounds all did well, mostly healing quickly ; in the case of the gauze being used as a vaginal plug is was found to act much better than iodoform gauze in deodorizing. Sanoform should replace iodoform in all those cases in which the latter has hitherto been employed.

Sanosin. (*Merck's Report*, **17,** 160.) This name has been applied to a mixture of charcoal, sulphur, and the powdered leaves of *Eucalyptus maculata citriodora*, with a little of the essential oil of the same. The mixture is ignited, and the mixed vapour of SO_2 and the essential oil evolved is said to have a decided beneficial effect in cases of phthisis.

Sapium sebiferum, Chinese or Vegetable Tallow. D. Hooper. (*Agric. Ledger*, **1904,** 11.) The concrete fatty matter which surrounds the seeds of the Chinese tallow tree serves to make candles and tapers, which are white and keep their colour for any length of time. In China this substance is used in place of animal tallow for the manufacture of candles, soap making, and also in dressing cloth. In candle making it is mixed with white insect wax in the proportion of three parts of wax to ten parts of the tallow. These candles are especially used in Buddhist ceremonies, as they burn with a clear, inodorous flame, without smoke. In religious ceremonies no other material is used. Vegetable tallow is imported from China in hard white cakes weighing about 1 cwt. In some blocks the exterior is of a reddish colour, while the inside is of a dull white. It is called locally *Pi-yu*.

In addition to the solid fat from the seeds, the endosperm or kernel yields about 50 per cent. of a brownish-yellow oil called *Tin-jow*, *jing-yu* or *tsé-iéow* in Chinese, and is used as a burning oil and also for the preparation of varnishes for umbrellas, etc., on account of its drying properties. It has a place in the Chinese Pharmacopœia, because of its quality of changing grey hair into black and other imaginary virtues. It has emetic properties and acts as a purge.

The chemical literature of the fats is fully reported ; an analysis of the pressed cake showed that it possessed but low manurial value. The seeds of some species of Sapium are poisonous to fish on account of the presence of an acrid substance resembling saponin. The oil-cake, therefore, is quite unsuitable for human

consumption. It is used in China as fuel, and on account of its slow combustion is employed for chafing dishes in the winter season.

Saponin, Physiological Action of Large Doses of. W. Lohmann. (*Zeit. für öffentl. Chem.*, **9,** 320–324, through *Analyst,* **28,** 361.) Daily doses of saponin, beginning with 0·5 Gm. and increasing by 0·5 Gm. up to 7 Gm., had no injurious effects on the health of a rabbit beyond a hardening of the excreta. A *post-mortem* examination showed that the internal organs were not affected. The doses were given mixed with the food. The author then himself took quantities of saponin, starting with 0·1 Gm. and finishing on the tenth day with 1 Gm. No ill-effects were observed.

Scammony Gum, Rapid Method for the Determination of Resin in. E. Dowzard. (*Pharm. Journ.* [4], **18,** 469.) When a Soxhlet or other repercolation apparatus is used for the determination of resin in scammony, a considerable time is required to ensure complete extraction. By using the following method, a determination can be made in about $1\frac{1}{4}$ hours.

Weigh 2 Gm. of the finely-powdered sample and transfer to a 50 c.c. conical flask; to this add 20 c.c. of ether (accurately measured). The flask is then closed with a sound, tightly-fitting cork: shake gently until complete disintegration takes place. The flask should be given a rotatory movement to prevent the solution from touching the cork. After standing for 15 minutes, with occasional shaking, the ethereal solution is passed through a dry filter-paper. Evaporate 10 c.c. of the filtrate to dryness in a weighed beaker; dry at 100°C. and weigh.

The percentage of resin is calculated as follows:—

0·1 Gm. of resin occupies a volume of about 0·075 c.c.

Example: 10 c.c. = 0·724 Gm. resin.

$$7{\cdot}24 \times 0{\cdot}075 = 0{\cdot}543 \times 2 = 1{\cdot}086.$$

This calculation shows that the 20 c.c. of ether has increased in volume to a little over 21·086 c.c.

$$\frac{21{\cdot}086 \times 0{\cdot}724}{10} = 1{\cdot}5266 \times 50 = 76{\cdot}33.$$

The example contains 76·33 per cent. of resin.

[Obviously, care must be taken that the temperature of the ether when first "accurately measured" and of the filtrate

when the 10 c.c. is measured, is identical; otherwise the correction for volume may not include so great an error as that of the two measurements at different temperatures.—Ed. *Year-Book.*]

Silin. (*Nat. Drugg.*, **34,** 107.) Chemically this is hexamethylenetetramine citro-silicate. It is used in uric acid diathesis, generally in some mineral spring water of alkaline reaction. A Silin Spring water is now being introduced in trade. This contains in each litre 3 Gm. Silin, 8 Gm. sodium chloride, 2 Gm. sodium carbonate, 2 Gm. calcium carbonate, 50 Cgm. magnesium sulphate, and 4·5 Gm. free carbonic acid.

Sodium Agaricate. (*Merck's Report*, **17,** 17.) This salt is used, like lithium agaricate, in the treatment of night sweats of phthisis, in doses of $1\frac{1}{2}$–3 grs.

Sodium Cacodylate in Phosphaturia. Lefebore. (*Merck's Report*, **17,** 8.) Favourable results have been obtained in the treatment of various forms of phosphaturia, both when the preparation was administered *per os* or injected subcutaneously. Daily doses of $\frac{1}{200}$–$\frac{1}{84}$ gr. were given. These internal doses may be administered without interruption until the phosphaturia disappears, though in some cases it may be advisable to periodically interrupt the treatment for a day after continuing the treatment for 15 days.

Sodium Parasulphobenzoate as an Internal Antiseptic. H. Woods. (*Chem. and Drugg.*, **64,** 56.) This salt, $C_6H_4\begin{cases}COONa\\SO_3Na,\end{cases}$ is readily obtained in permanent well-formed crystals by boiling together solutions of sodium sulphocarbolate (B.P.) and sodium formate in the proportions of their molecular weights, evaporating the solution carefully, cooling and crystallizing. The white crystalline deposit thus obtained is sulphobenzoate of sodium, and consists of very fine silky needles.

It is considered probable that the salt will be found to have useful medicinal properties, particularly for correcting septic and gouty conditions of the urine and urinary organs. It has proved valuable as a disinfectant in gastric and intestinal affections and as an antiseptic in typhoid, gastritis, fermentative dyspepsia, and similar morbid states of the digestive tract.

Sodium Sozoiodate. L. S. Gouladze. (*Merck's Report*, **17,** 169.) This salt, $C_6H_2I_2OH.SO_2Na+2H_2O$, consists of colourless and odourless acicular crystals, and dissolves in 15 parts of water.

It is found that, although the coarse crystalline powder may cause a little irritation, it is preferable to employ it in this state than in a finely divided powder, since in its more finely powdered state, after application to the wound a dough-like mass is formed which delays for a considerable time the process of granulation and the formation of a scar. The coarse preparation is, accordingly, preferable to the fine powder.

Spermacoce indica, Seeds of. E. M. Holmes (*Pharm. Journ.* [4], **18,** 496) and D. Hooper. (*Ibid.*, 699.) Holmes records the regular occurrence of these seeds in the London drug market during the past two years. The plant yielding them belongs to the *N.O. Rubiaceæ*, and are said to be used as a substitute for coffee on the Continent. They are imported from Ceylon.

Hooper reports that the examination of the seeds, which are stated to exactly resemble coffee when roasted, gives the following figures: Water, 10·75; fat, 9·12; albuminoids, 12·44; carbohydrates, 37·76; cellulose, 23·23; ash, 6·70; total, 100·00.

An alcoholic extract contained a bitterish principle, giving the reactions for an alkaloid, an astringent substance affording a green colour with ferric salts, and a yellow colouring matter turning orange with alkalies. These seeds, therefore, contain similar constituents to those found in coffee, and when roasted over a fire they develop an odour very closely resembling the well-known beverage.

It must be admitted that there is no urgent demand for a coffee substitute, especially in South India, where planters are only too anxious to dispose of the real article. But, considering that other grains and roots have for a long time been used in place of coffee, and are still offered in the market, there is no reason why the seeds of the "shaggy button weed" should not be tried in the same connection. They certainly possess an advantage over "negro coffee," made from the seeds of *Cassia occidentalis*, which have purgative properties, and also over a preparation called "coffee" made from date stones. The commercial future of *Spermacoce* will depend upon the abundance of the plant and the labour involved in collecting the seeds.

The seeds of this plant, under the name of "dhoti," were eaten in Bombay during the famine of 1877–78. And, during the periods of scarcity, two and three years ago, the green portion of the plant was boiled and eaten as a pot-herb by the Santalis in Chota Nagpur, and by the poorer people in Monghyr, in the Bengal Presidency. With this evidence we may conclude that *Spermacoce hispida* has no very potent medicinal properties, and as an occasional article of diet it may be regarded as not injurious.

Spigelia, an Adulterant of. R. H. True. (*Proc. Amer. Pharm. Assoc.*, **51**, 175.) The rhizome of *Ruellia ciliosa*, *N.O. Acanthaceæ*, is stated to be widely substituted for *Spigelia marylandica*. It may be detected by the presence of distinctive cystoliths and thickened schlerenchyma. The nature of the substitute was discovered by a number of the roots purchased for cultivation proving to be *Ruellia*, although offered in good faith as *Spigelia*. It is stated that the description of the drug in many text-books refers to the dried roots of *Ruellia* and not to the true *Spigelia marylandica*.

Stovaine. F. de Lapersonne (*Bull. Comm.*, **32**, 177) and E. Fourneau. (*Journ. Pharm. Chim.* [6], **20**, 108.) Stovaine, a new anæsthetic, is the hydrochloride of dimethyl-amino pentanol benzoyl ester. It is stated that 1 per cent. solutions are markedly less toxic than cocaine solutions of the same strength, and are efficient anæsthetics for local use. On instillation into the eye, stovaine produces a powerful but superficial anæsthesia, sufficient to allow of operations on the conjunctiva and cornea, and even of cataract. Its application is, however, more painful than that of cocaine, and the effect on the cornea is not so complete or so persistent. Its use is followed by no ill-effects, except sometimes a slight desquamation. When injected, however, either hypodermically or under the conjunctiva, stovaine is superior to cocaine; anæsthesia is complete in a minute and persists long enough to allow the operation to be performed. To increase the power of the instillations it is proposed to combine cocaine, 1 part, with stovaine, 2 parts. The toxicity of the former is thus lessened, and the penetration of the anæsthetic action ensured.

Strophanthus gratus, Pharmacognosy and Chemical Constituents of. E. Gilg, H. Thoms, and H. Schedel.

(*Berichte Pharm.*, **14,** 90, through *Pharm. Journ.* [4], **18,** 595.) The adoption of *Strophanthus gratus* as the official source of strophanthus seeds is strongly advocated.

Gilg emphasizes the fact that *Strophanthus kombé* seed is not easily obtained pure in commerce, and remarks on the very great difficulty in distinguishing the seeds of different species—by histological examination—in the present state of knowledge, the external macroscopical characters of colour, shape, and degree of hairiness being also of little use for that purpose. But he finds that the seeds of *Strophanthus gratus* can be distinguished from all other known African species by the eye alone. The plant occurs in the coast districts of Sierra Leone, extending to the mouth of the Congo River, in Gaboon, as well as in the Cameroons, so that it is procurable on English, French, and German territory. He has definitely ascertained that the seed of *S. tholloni*, from which the seed known also as Ineé, or "*Strophanthus glaber*," was supposed to be partly obtained, is easily distinguished from that of *S. gratus*. The seed of the latter is broadly spindle-shaped, more or less rounded at the base, of a light yellow-brown colour, and hairless, 11–19 mm. long, 3–5 mm. broad, and $1\frac{1}{3}$ mm. thick. The shaft of the awn is $\frac{1}{2}$ cm. long, and the hairy part 4–5 cm., whilst the seeds of *S. tholloni* are very long and narrowly spindle-shaped, tapering above and below, and moderately covered with minute yellowish-brown hairs. The shaft of the awn is only 5–7 mm. long, and the hairy part 9–12 mm. The only other smooth strophanthus seeds at present known are found in Indo-Malaya, and these are of a darker brown or blackish colour.

Thoms has extracted the strophanthin from the seeds of *Strophanthus gratus* and compared it with an authentic specimen of the ouabain of Arnaud, sent to him by that chemist as obtained from the woody stems of *Acokanthera schimperi*, and is able to confirm the absolute identity of the two active principles. He gives the formula, $C_{30}H_{45}O_{12}9H_2O$.

Arnaud has indicated that the strophanthin of *S. kombé* differs in the presence of a methyl group from ouabain, and Thoms believes that the strophanthins of different strophanthus seeds differ in the presence of water of constitution, or of an alkyl group, and, therefore, prefers to drop the name ouabain, as likely to lead to confusion if used in medicine, and to distinguish the different kinds of strophanthin by the initial letter of their specific names; thus, that of *S. kombé* would be k·

strophanthin; of *S. gratus*, g-strophanthin; of *S. emini*, e-strophanthin; and of *S. hispidus*, h-strophanthin.

For the k-strophanthin, a crystalline specimen of which he received from Arnaud, he quotes the formula $C_{31}H_{48}O_{12}$. The pseudo-strophanthin of Feist, being extracted from seed not botanically authenticated, appears to Thoms of doubtful value.

In the seeds of *S. kombé*, as well as in those of *S. hispidus*, Thoms finds choline and trigonelline; these are separated from the aqueous solution of strophanthin by the use of ammonium sulphate, which causes the strophanthin to separate out in flakes, which unite to form a sticky mass.

The strophanthin of *S. hispidus* he did not obtain crystalline, but only as an amorphous powder, and for this strophanthin he gives the formula $C_{31}H_{48}O_{12} + \frac{1}{2}H_2O$.

The g-strophanthin was obtained from the seeds of *S. gratus* by first removing the fat by means of petroleum ether, then extracting with absolute alcohol in a Soxhlet apparatus for 3 days, distilling off the alcohol, and extracting the residue with warm water. The aqueous solution was allowed to stand, then filtered, and the filtrate evaporated and set aside to crystallize. The yield proved to be 3·615 per cent. of a crystalline product. Thoms suggests that the following description might serve as a monograph for the description of g-strophanthin in the Pharmacopœia :—

G-Strophanthinum Crystallisatum, $C_{30}H_{46}O_{12} + 9H_2O$. A crystalline glucoside obtained from the seeds of *Strophanthus gratus*, Franchet, in colourless, satiny, quadratic tables, easily soluble in hot water, in about 100 parts of water at 15°C., in 30 parts of absolute alcohol, 30 parts of amyl alcohol, difficultly soluble in acetic ether, ether, and chloroform. The solution of 0·01 Gm. in 1 Gm. of water poured on concentrated sulphuric acid gives it a rose or red colour, whilst the watery solution assumes a dirty green colour. It loses 20 per cent. of moisture when dried at 105°C., and the dried glucoside melts at 187–188°C. When burnt it does not leave any residue. It must be very carefully used.

The solubility is elsewhere stated to be 1 in 3,000 parts acetic ether, 3,000 of chloroform, and 52,000 of ethyl ether. The sugar set free when g-strophanthin is hydrolized by warming with dilute hydrochloric or sulphuric acid proved to be rhamnose.

According to Schedel's experiments, strophanthin is useful in all valvular diseases and those depending on muscular degeneration and a weak condition of the heart.

As compared with digitalis, it acts more quickly, improvement taking place in a few hours. It can be used subcutaneously; it produces less unpleasant symptoms, even after a week's administration. The cumulative action appears later, and by virtue of its quicker absorption, the more quickly appearing slowness of the pulse affords an earlier warning for the discontinuance of the remedy. The dose is best given in a 1 per cent. watery solution, up to 5 drops; more than 10 drops are rarely required to produce the desired effect. The enormous variation in the strength of strophanthus tincture, and the impossibility of using it subcutaneously, render the use of a definite crystalline strophanthin a form of administration on which more reliance may be placed.

Styptol (*Merck's Report*, **17,** 172) is the neutral phthalate of cotarnine, a yellow micro-crystalline powder containing 73 per cent. cotarnine, and freely soluble in water. It is also supplied in the form of tablets containing $\frac{1}{2}$ gr. It is employed as a styptic in hæmorrhage, chiefly in gynæcological practice, and in the treatment of menorrhagia.

Subcutine (Subcutol). (*Merck's Report*, **17,** 173.) Subcutine, $C_6H_4\begin{cases}NH_2.SO_3H.C_6H_4OH \\ COOC_2H_5,\end{cases}$ or anæsthesin paraphenol sulphonate, is a white powder consisting of fine acicular crystals. It fuses at 195·6°C. Cold water dissolves 1 per cent.; water at a temperature of about 35°C. takes up 2·5 per cent.

The preparation, both in the solid state, and as a solution, produces numbness on the tongue; it keeps well when dissolved, and can be boiled without undergoing a change. It exercises an inhibitory effect upon the growth of the bacteria of typhoid and cholera, and is as innocuous with respect to the human system as anæsthesin.

Becker has applied subcutine by Schleich's method of infiltration, the solution used by him being of the following composition: Subcutine, 12–15 grs.; sodium chloride, 11 grs.; distilled water, $3\frac{1}{4}$ oz.

This solution has proved to be an excellent anæsthetic in a large number of operations, and since it does not give rise to inflammation, it is well deserving of a wider application.

Tannochrom. J. W. Frieser. (*Aertz. Central. Zeit.*, through *Pharm. Centr.*, **45,** 262.) A chemical compound of

chromium oxide, 1 ; tannin, 4 ; and resorcin, 8, has been introduced as a disinfectant and astringent in the form of a powder and as a 50 per cent. solution. The latter is specially recommended as a dressing for wounds ; the powder may be similarly used as a 5 or 10 per cent. dressing ointment ; a 5 per cent. collodion forms an effective application to chilblains ; fistulas have been healed by syringing with a $\frac{1}{4}$ to 1 per cent. solution, then dressing with 10 per cent. gauze ; hæmorrhoids have also been successfully treated by local application of the remedy.

Theobromine as a Hypnotic. Gallavarelin and Pehu. (*Lyon Med.*, through *Bull. Gén. de Therap.*, **147,** 74.) Although the diuretic and stimulant effects of theobromine are well known, the fact that it is a safe and pleasant hypnotic, specially suitable for administration to patients suffering from arterio-cardiac diseases, has been overlooked. It is found that doses of $7\frac{1}{2}$–30 grs. will relieve the distressing insomnia which often accompanies heart affection, giving refreshing sleep without producing any ill after-effects.

Thermodin (*Merck's Report*, **17,** 176) is acetyl para-ethoxyphenyl-urethane,

$$C_6H_4(C_2H_5O)NCO_2.C_2H_5.CO.CH_3,$$

and forms white odourless crystals. It is sparingly soluble in water and fuses at 86–88°C.

G. D. Spineanu has during the last three years closely investigated the pharmaceutical properties of thermodin in the treatment of malaria and other febrile affections, such as tuberculosis, pneumonia, eruptive fevers, etc.

Thermodin is entirely without toxic properties. On account of its very imperfect solubility in water it is adapted for internal administration only. Children under 10 should be given 30–45 grs. per day in doses of 8 grs., and adults 45–75 grs. per day in doses of 15 grs. In addition to each dose of thermodin children under 10 should be given 10–20 drops of the following mixture : Acetylii chloridi, 15 grs. ; aq. dest., 30 ♏ ; 10–20 drops to be given in 3 to 5 oz. of sweetened water.

The acids resulting from the decomposition of the acetyl chloride enhance the solubility of thermodin, besides which acetyl chloride has a peptonizing effect upon the nutrients.

Thermodin possesses powerful sudorific and bactericidal properties. Over quinine it has the great advantage that its

antipyretic properties are not marred by unpleasant concomitants.

Thymyl Trichloracetate. E. Liotard (*Nouv. Remèdes*, **19,** 243) has obtained this compound by heating thymol with trichloracetic acid. A liquid is formed from which excess of thymol crystallizes out, while the trichloracetate separates in a saccharoid form on the addition of a little water. It is insoluble in water, but dissolves in alcohol and in ether. It melts at 44°C.

Tradescantia erecta as a Hæmostatic. Simonin. (*Merck's Report.* **17,** 193.) The fresh pounded herb, as well as a 20 per cent. decoction of dry plant, is stated to be an excellent hæmostatic used externally and internally. The 20 per cent. decoction was applied with good results in a case of severe epistaxis arising from purpura, in pseudohæmoptœa of a naso-pharyngeal origin and in hæmorrhages after the operative removal of polypi of the ear. The special advantage of the preparation lies in its innocuous nature, and the ease with which it can be handled.

Trigemine. (*L'Union Pharm.*, **45,** 12.) Trigemine is a combination of butylchloral hydrate and pyramidon. It occurs in long white needles melting at 85°C. It has a characteristic odour and a sweetish taste. It is readily soluble in water. It is stated to be much more intensely sedative and analgesic than butylchloral hydrate. It is given in doses of 8–16, or even 30 grs. in 24 hours, an average dose for an adult being 10 grs. twice daily. It is chiefly indicated in headache, and facial or dental neuralgia.

Turmeric, Rapid Detection of, in Powdered Rhubarb. G. Griggi. (*Boll. Chim. Farm.*, **1**, through *Amer. Drugg.* **211,** 296.) One Gm. of powdered rhubarb is mixed in a mortar with 0·10 Gm. of finely powdered boric acid. The mixture is placed in a porcelain capsule with a flat bottom and is moistened with 9·6 Gm. of dilute H_2SO_4. The capsule is heated moderately over a Bunsen burner, the pulp-like mass being in the meanwhile well stirred with a glass rod.

Pure rhubarb under this treatment does not show any changes except that it grows slightly darker in colour, this dark-brown tint becoming more marked and verging upon greyish as the heating is prolonged, until finally the rhubarb undergoes torrefaction.

Rhubarb which is sophisticated with turmeric assumes grada-

ally with the application of heat a beautiful dark reddish-purple colour, which is the more intense the more of the adulterant there is in the sample. This purple colour is due to the formation of the so-called rosocyanin of Schlumberger.

If the mixture be moistened with a dilute solution of ammonia before the capsule cools, and if the powder is pure rhubarb, it will assume the characteristic colour which rhubarb takes in the presence of alkalies. If, however, the powder is sophisticated with turmeric, the rosocyanin will assume a transient blue colour, and after a short time will turn to a dirty grey.

Turmeric, Test for. J. E. Saul. (*Pharm. Journ.* [4], **18,** 29.) The reaction described by O. E. Bell (*Year-Book*, **1903,** 167) is found not to be due in any degree to the diphenylamine employed in the reagent, which is directed to be prepared with diphenylamine, 1 Gm., alcohol 90 per cent., 20 c.c., pure sulphuric acid, 25, since the characteristic violet colour reaction is given with equal intensity with a simple mixture of acid and alcohol in the above proportions.

Vanadic Acid. (*Merck's Report*, **17,** 11.) Highly diluted solutions of vanadic acid have, according to the testimony of Le Blond and Ch. David, proved generally efficacious, and specially so in gynæcological practice. It manifests antiseptic and cicatrizing properties when applied externally as a solution of 1 : 5,000 in superficial wounds, or as a solution of 1 : 4,000 in intra-uterine wounds. It is eminently adapted as a topical application in various lesions of a tuberculous and syphilitic origin, in eczema, chancre and vaginitis. The acid may likewise be administered internally in tuberculosis and all anæmic and cachectic conditions. By the administration of 2 tablespoonfuls per day of a solution of 1 : 4,000 satisfactory results were obtained.

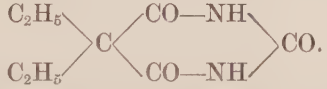
A mixture of 1 part by volume of a 1 : 5,000 solution of vanadic acid and 2 parts by volume of glycerin is commercially known by the name of "Oxydasine."

Vanilla, Presence of Heliotropin in Certain Varieties. Goeller. (*Pharm. Centr.*, **45,** 192.) The fruits of *Vanilla pompona*, which, under the name of vanillons, pompona, or La Guayra vanilla, come into commerce in considerable quantity, contain

heliotropin as well as vanillin. This kind of vanilla is readily distinguished from the true variety by its larger, shorter and thicker "pods." There is, however, another variety of vanilla coming from Tahiti and produced by *Vanilla planifolia*, which also contain heliotropin; except from their odour, these are indistinguishable from ordinary vanilla.

Vegetable Powders and their Diagnostic Characters. H. G. Greenish and E. Collin. (*Pharm. Journ.* [4], **18,** 283.) A further series of descriptive illustrated articles on the microscopical characters of powdered drugs deals with roots and rhizomes, including calumba root, gentian root, ginger rhizome, jalap root, licorice root and marsh mallow root. (See also *Year-Book*, **1903,** 257.)

Veronal. (*Merck's Report*, **17,** 185.) This new soporific has been introduced by Emil Fischer and J. v. Mering. Chemically it is dimethyl-malonyl-urea or diethyl-barbituric acid of the composition



This chemical consists of small, colourless and transparent crystals, which fuse at 191°C. and dissolve at 20°C. in 145 parts of water. It is odourless, and has a slightly bitter taste. Its therapeutic importance is greatly enhanced by the circumstance that it forms freely soluble alkaline salts, and that it is accordingly easily absorbed in the intestines.

It has been widely tested, and is favourably reported on as a pleasant and safe hypnotic in all cases of simple insomnia. It affords natural refreshing, dreamless sleep in the insomnia of neurasthenia, hypochondria and hysteria. It also proves to be a valuable sedative in nervous diseases, and has been given with benefit in bronchitis, laryngitis, cystitis, muscular rheumatism, and in insomnia caused by pain. No ill-effects have been observed to follow its use.

Veronal is best administered in warm tea or warm milk, generally in doses of 4–12 grs. It is also prepared in the form of cocoa tablets containing 8 grs. of veronal which quickly dissolve in water. These tablets are notched and can easily be broken in two, so as to facilitate the administration of doses of 4–12 grs. Large doses of 15–30 grs. are required in maniacal conditions, intense alcoholism, delirium tremens, conditions of excitation

attended with very intense confusion of ideas, insomnia occurring in infectious diseases and in epileptic and hysterical conditions. During prolonged use it may occasionally happen that the patient becomes accustomed to the effects of veronal, which shows itself in a slightly retarded action. In these cases the dose of 8 grs. should be increased by 1 gr. every day up to 15 grs. a dose, which need rarely be exceeded.

Virginian Prune Bark, Spurious. H. Finnemore. (*Pharm. Journ.* [4], **18,** 360.) A parcel of powdered "Virginian Prune" bark, and also of whole bark, which excited suspicion from the fact that no benzaldehyde was formed on moistening, was found on examination not to agree with the official description of Virginian prune bark.

Characters of Spurious Whole Bark. The majority of the bark was stem bark; colour varying from reddish-brown to greenish-brown, devoid of the thin, papery cork; lenticels less numerous than in the official variety, but much larger in size, in the large pieces being composed of doubly-convex patches of cork 1 inch in length. Fracture fibrous, especially in the inner bark. A smooth transverse section exhibits wavy medullary rays. Taste bitter and astringent, but not aromatic; no odour of the bitter almond is developed upon maceration with water.

Microscopic Characters. On the outside of a transverse section is the epidermis composed of flattened cells, next is the cortex, measuring about one-fourth of the width of the bark, containing more or less flattened and irregular parenchymatous cells with numerous crystals of calcium oxalate in stellate masses and sclerenchymatous fibres scattered irregularly throughout, many of these being cut longitudinally in such a transverse section of the bark. Wavy medullary rays, generally three to four cells wide, are present in the bast. Bast fibres, some isolated, others in groups, are present on each side of the space between the medullary rays. The medullary rays resemble those of all cherry barks in the ease with which they split away from the adjoining tissue. No stone cells of irregular shape were found either in a cross or longitudinal section. In the latter the long bast fibres were seen.

Portions of the bark were then treated with a mixture of nitric acid, 1 oz.; water, 1 oz.; potassium chlorate, 40 grs., for about 15 hours at the ordinary temperature, and portions teased out with needles and examined under the microscope.

There were present ordinary parenchyma and sclerenchymatous fibres of great length.

A small portion of genuine Virginian prune bark when similarly treated showed a marked difference in the sclerenchyma; in this it was in the form of stone cells of irregular shape. No fibres as in the above were present.

It may be noted that there is no difficulty in recognizing sclerenchyma in a preparation so treated without the use of reagents, as it appears more translucent than the other elements.

Having thus obtained in the difference between the sclerenchyma a means of distinguishing the genuine from the spurious, this test was applied to the bark in the powdered form. Each was reduced to a fine powder in the mortar, and a small portion was placed on a slide and covered with a solution of phloroglucin, then with strong hydrochloric acid, and the slide examined. In the genuine the characteristic stone cells are stained bright pink, while the false bark shows its characteristic fibres in the same way.

The powdered spurious bark was next examined in the same way, and this showed the characteristic fibres which are present in the above spurious whole bark, but entirely absent from the genuine.

The powder obtained from these spurious barks are lighter in colour than the genuine, and are softer to the touch. Syrups made from the same are darker in colour than syrup made from the genuine. They are also devoid of the characteristic aromatic odour and taste.

The above results are interesting as pointing to the use occasionally of a *Prunus* other than *Prunus serotina* (the official variety). This is borne out by the analyses of Virginian prune preparations by Hawkins (*Year-Book*, **1889,** 491). Certain of these contained no hydrocyanic acid.

It is recommended that the following test be introduced into the official monograph of Pruni Virginianæ Cortex: "When the powdered bark is covered with a solution of phloroglucin and then with hydrochloric acid, no abundance of long sclerenchymatous fibres should be observed under the microscope."

The paper is illustrated with woodcuts of the distinctive histological elements of the two barks.

Yohimbine Hydrochloride. (*Merck's Report*, **17,** 190.) Yohimbine hydrochloride is an active and harmless aphrodisiac, having given good results in neuropathic impotence, where hydropathic

and electrotherapeutic treatment had failed. Magnani found that yohimbine exercises an anæsthetic action on the cornea and conjunctiva, Löwy and Müller conclude that cocaine and yohimbine differ quantitatively only, but that they are absolutely alike in qualitative respects. Yohimbine is qualified to diminish or even suppress entirely the excitability and conductivity of motor and sensory nerves when applied directly to the latter; it also induces anæsthesia when applied to the nerve endings of the mucous membranes. As with cocaine, this action is only transitory.

Haike finds that the cornea and conjunctiva can be made insensible within 10 minutes, with a few drops of yohimbine, whilst a 2 per cent. solution is needed for inducing anæsthesia of the mucous membrane of the nose. In otology a 1·5 per cent. solution in 30 per cent. alcohol may be used for the same purpose. The action of yohimbine is not sufficiently intense for deep cauterization, but it is well adapted for such cases where it is desired to induce anæsthesia without local anæmia, and in cases where complete anæsthesia is not necessary, where it is preferable to cocaine.

According to Magnani, yohimbine is a suitable anæsthetic for small operations of the eyelid, whilst Salomonsohn prefers it in corneal operations or in those cases where no importance attaches to cosmetic anæsthesia, such as results from the use of cocaine or adrenaline.

PHARMACY.

PART III.

PHARMACY.

Adhesive Plaster, the Manufacture and Spreading of. A. W Gerrard. (*Pharm. Journ.* [4], 18, 255.) The first essential of a good adhesive plaster is the base or compound used to impart the adhesive property to the fabric on which it is spread. This base should possess neutrality, freedom from irritating ingredients, a melting or softening point of 98–100°F., strong stickiness or power of adhesion. The latter quality is highly essential as it enables the spread plaster to remain firmly in place where used to support a limb or fix a splint. Lead plaster or diachylon has been from ancient times the most important and best esteemed of the plaster bases, and is well adapted for the purpose intended. The following was the formula and *modus operandi* employed at Guy's Hospital some 40 years ago for the preparation of lead plaster, which gave a product having a wide reputation for excellence in the surgical profession: 6 gallons, or about 55 lb., of good olive oil was placed overnight in a steam-jacketted pan, together with 30 lb. of powdered litharge and 5 gallons of water; it was then given a good stirring. The following morning the steam was turned on and maintained at 30–33 lb. pressure, from 3 to 4 hours, with constant stirring. If it were found, on examination, that the whole of the litharge had entered into combination with the oil, another ½ lb. of litharge was added and a further portion of water; the boiling was then continued until a slight excess of uncombined litharge remained in the plaster. If, however, the litharge first used were found to give an excess, no more was added. This proceeding was quite a reasonable one, for if we consider the unconstant character of olive oil, and sometimes of litharge, the quantity of the latter needed to give a perfect lead oleate must be variable. Moreover, long experience has demonstrated that lead plaster, made as described, keeps better, and is less prone to rancidity than a plaster containing excess of oil.

The lead plaster of the B.P. would be improved by the use of additional litharge, and would be less liable through rancidity to cause irritation when brought in contact with the skin. One other important point in the manufacture of lead plaster to which particular attention is needed, is the removal of the glycerin formed in the process; to allow it to remain is not only detrimental to the plaster's adhesiveness, but produces unsightly glycerin blotches on the fabric on which it is spread. The complete removal of glycerin can be effected by continuing the heat until the whole of the water has evaporated and the plaster becomes semi-transparent; when this point is reached glycerin vapour passes off readily, and can be easily distinguished from the vapour of water by its greater transparency. The whole of the glycerin need not, however, be evaporated in this way, for glycerin is practically insoluble in lead plaster. If, therefore, the plaster, quite free from water, be allowed to slowly cool, the glycerin rises to the surface, and can be readily removed with a sponge. Lead plaster thus made is now in good condition to employ as a general base. It may be interesting to mention that the above process of manufacture is not quite that of the wholesale drug trade; it is their custom to pour the fresh-boiled plaster into water, submitting it to a pulling process with the hands, thus imparting whiteness and increasing its weight by incorporation of water. This practice of pulling is a very old one, and is said to be esteemed by the trade. Such treatment is absolutely useless; it is, in fact, detrimental. The future B.P. should require lead plaster to be almost, if not quite, water free. Lead plaster made by the formula above given is of a pale, greyish-brown colour, tough and flexible, not easily fractured. Small pieces held between the finger and thumb soon soften and become sticky: kept a month or two, it increases in hardness and easily fractures, otherwise retaining its original qualities.

Lead plaster pure and simple is rarely employed alone in spreading; it is usual to improve its adhesive qualities by combining it with soap and certain resins. The resin plaster of the B.P. is a typical useful formula especially suitable for spreading during the cold winter months, but in summer it is advisable to employ half the official quantities of soap and resin, otherwise the plaster may spoil by sticking to itself. It has been said that if it be wished to make lead plaster more adhesive excess of olive oil must be employed in its manufacture. This

is quite erroneous, for though oil softens plaster, and makes it plastic, it adds nothing to its holdfast tight-grip qualities. Resins are without doubt the best of all additions to increase adhesiveness, and not only is common resin invaluable in this respect, but likewise the oleo-resins of elemi and thus. The judicious employment of what is called gum thus in the official resin plaster enables it to retain self-adhesive properties for a considerable time. A good working formula for adhesive plaster is the following: Lead plaster, 16; ordinary yellow soap, 1; resin, 1; thus, 1.

Shred the soap finely, adding same to the melted resin and thus, stir well until dissolved, lastly add the lead plaster, continuing the heat until all is evenly mixed, then strain. Ordinary yellow soap is recommended to be used because it is found to give a better plaster than official hard soap. If it is required to increase the adhesiveness of any plaster it may be accomplished by the addition of gum thus.

All machines employed for spreading plasters on the large scale consist essentially of a V-shaped trough, about 20 ins. long, provided with a false bottom and two stout iron ends or cheeks; into grooves inside these cheeks slide two iron plates, so as to rest firmly and evenly on the false bottom. The plates can be raised or lowered by means of thumb-screws, so as to regulate the thickness the plaster is to be spread. The cloth to be spread is cut to the required width, and formed into a roll; the loose end of the cloth is then placed under the two plates, and the trough filled with the melted, strained plaster. The front plate having been adjusted, the cloth is drawn through the machine, and issues as spread plaster. It is of considerable importance that the bed of the machine and the lower edge of the plates have parallel planed surfaces, otherwise the spread plaster will be uneven.

A simpler form of apparatus consists of two straight-backed chairs, along the top back rails of which is placed a row of sharp hooks (tenter hooks). The cloth, 3 yards long and 12 ins. wide, is fixed on the hooks and evenly stretched. To keep the chairs rigid while spreading, heavy weights must be placed on the seats. The plaster, melted in a saucepan, is now poured on one end of the cloth, near the hooks, and drawn smoothly and evenly along the cloth to the other end by means of the large, stout and stiff spatula. The spatula must be made warm and worked on its edge. A second portion of plaster is poured on and

spread back to the starting point. Any excess of plaster can be picked up by a dexterous move of the spatula and returned to the saucepan.

The edges require trimming with a sharp pair of scissors, and the plaster may then be cut off at the ends near the hooks and hung till ready for rolling. A small amount of plaster always drops over the side of the cloth on to a board provided to receive it; this can be gathered up and used again. With this apparatus 60 yards of plaster can easily be spread in 1 hour, giving as good a plaster, both in quality and appearance, as the more costly machine first described.

When selecting a fabric for spreading on, never employ the cheap plastered and dressed-up stuff sold as glazed calico; though it looks well when spread, it makes the worst of all plasters, so that most surgeons call it rubbish, and will not use it. The best fabrics to employ are brown holland, linen and calico; these should be of medium texture, free from dress or filling. A piece of the fabric placed under a $\frac{1}{4}$ in. linen-tester should show about 14 threads both on the warp and weft, and should be fairly close woven. The most favoured of all adhesive plasters is that on brown holland, the demand for which exceeds all other kinds.

Adrenaline, Soluble Powder of. —Mansier. (*Répertoire de Pharm.* [3], **15,** 481.) Since adrenaline in dilute solution is extremely unstable, and the weighing of the minute doses often prescribed is inconvenient, the following 1 per cent. powder is suggested as affording a convenient means of dispensing the styptic: Andrenaline, 1; citric acid, 2; boric acid, 97. Rub the adrenaline with the citric acid, then gradually rub down with the boric acid. Sift. One Cgm. of this powder corresponds exactly to 2 drops of a 1 : 1,000 solution, the most frequently prescribed form. This powder is soluble in water, and may be used whenever adrenaline is prescribed in solution or in an ointment.

Airol Paste, Brun's. (*Therap. Monats.*, **17,** 269.) Airol, 5; mucilage of acacia, 10; glycerin, 10; white bole, q.s. to make a soft paste. This paste may be kept for a long time in a suitable condition for use if preserved in stoppered or corked bottles, but care must be taken that it does not come in contact with metal.

Alum Curd. (*Spatula*, **9,** 85.) This preparation, which is often prescribed as an application for mild inflammation of the eyes, should be prepared by dropping a lump of alum into fresh milk. When the curd sets, the undissolved alum should be removed. Powdered alum should not be used, since it cannot be separated from the curd clot.

Anæsthesine, Pharmacy of. L. Duplan. (Formulary of *Bull. Gén. de Thérap.*, **148.**) In addition to the spray, ointment and injection already published (*Year-Book*, **1903,** 191), the following preparations of anæsthesine are recommended:—

Analgesic Ointment. Zinc oxide, 15; starch powder, 15; salicylic acid, 1; xeroform, 3; glycerin, 10; anæsthesine, 5; vaseline, 25; lanoline, 25. Mix. For burns, painful skin affections, itching, etc.

Lotion for Ulcerous Affections. Anæsthesine, 1; distilled water, 200.

Urethro-vesical Injection. Guaiacol, crystalline, 6; anæsthesine, 3; benzoic acid, 0·35; oil of sweet almonds, 60. For use in bladder affections.

Anæsthesine-mercury Injections for Syphilis. (1.) Calomel, washed with alcohol and dried, 10; anæsthesine, 10; liquid vaseline, sterilized, 100. (2.) Mercury salicylate washed with alcohol and dried, 10; anæsthesine, 10; liquid vaseline, 100.

The dose of the first is 1 c.c. syringeful every 8 days; of the second the same quantity every 3 or 4 days. The addition of the anæsthesine renders these injections much less painful than those of the mercurial salts alone.

Anthrasol, Pharmacy of. (*Muench. Med. Woch.*, **50,** 18.) Anthrasol is a mixture of equal parts of purified coal tar and juniper woodtar. It occurs as a bright yellow, oily liquid, soluble in alcohol to the extent of 1 : 20 or 1 : 10; readily dissolved by acetone, oils, and vasogen. It is used as a substitute for tar in various skin affections. It may be prescribed in the following manner:—

Anthrasol Spirit. Anthrasol, 2–10; absolute alcohol to make 30.

Anthrasol Ointment. Anthrasol, 2–10; vaseline and lanoline, of each, 30.

Anthrasol Paste. Anthrasol, vaseline, of each, 5; zinc oxide, 10; wheat starch, 10.

Anthrasol Glycerin Paste. Anthrasol, 2–5; zinc oxide, 20; white gelatin, 20; glycerin, 25; water, 30.

Wilkinson's Ointment with Anthrasol. Anthrasol, 5–10; precipitated sulphur, 10; soft soap, 2–10; vaseline or zinc paste to make 40; prepared chalk, 10.

Antikamnia. Antipyreticum Americanum. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 505.) Sodium bicarbonate, 6; caffeine, 3; antifebrine, 21. Mix. (Generally prescribed in tablets.) Dose, 5 grs.

Antiseptic Powder, Soluble. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 398.) Salicylic acid, 5; phenol, 1; menthol, 1; thymol, 1; eucalyptol, 1; zinc sulphate, 125; boric acid, 866. Mix.

Antiseptic Solution, Alkaline. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 397.) Potassium bicarbonate, 40 Gm.; borax, 10 Gm.; salicylic acid, 12 Gm.; benzoic acid, 6 Gm.; thymol, 0·1 Gm.; eucalyptol, 0·1 c.c.; menthol, 0·2 Gm.; oil of winter-green, 0·4 c.c.; solution of carmine, 1 c.c.; tincture of cudbear, 15 c.c.; glycerin, 250 c.c.; water, q.s. to make 1,000 c.c.

Dissolve the potassium bicarbonate and borax in 650 c.c. of water. Dissolve the acids, menthol, thymol and essential oils in the alcohol [no alcohol is given in the formula.—Ed. *Year-Book*] and mix with the glycerin. Mix the two solutions, add the carmine and tincture, and finally enough water to make 1,000 c.c. Allow to stand a few days and filter.

Aqua Imperialis Ph. Ital. II. (*Journ. Pharm. d'Anvers*, **60,** 43.) Potassium borotartrate, 10; sugar, 30; water, 500. Dissolve.

Aromatic Elixir. W. L. Scoville. (*Amer. Journ. Pharm.*, **76,** 158.) A better flavoured preparation than that made with essential oils of orange and lemon (as prescribed in the compound spirit of orange, U.S.P.), is produced by using tinctures of fresh orange and lemon peel; the freshness and fruitiness is further enhanced by the judicious addition of certain wines. The tinctures are made by macerating 1 part of the thinly cut fresh peel, free from white, with 2 fluid parts of alcohol 94 per cent., for 48 hours; draining off the tincture through a filter,

and washing the residual peel with sufficient alcohol to make the final volume up to 2 fluid parts.

Various wines were tried; the most satisfactory results resulted with the use of American muscatel; tokay, sweet and dry catawba and angelica also gave good results. The formula suggested is as follows: Tincture of fresh orange peel (1 : 2), 15; tincture of fresh lemon peel (1 : 2), 3; oil of coriander, 0·25; muscatel wine, 125; deodorized alcohol (95 per cent.), 230; simple syrup, 375; distilled water, q.s. to make 1,000 fluid parts.

Dissolve the tinctures and oil in the alcohol, add the wine and then the syrup. Then add gradually, with agitation, enough distilled water to make 1,000 fluid parts of mixture. Diffuse 10 Gm. of purified talcum through the liquid, and shake it occasionally during 4 to 7 days; then filter, returning the first portions to the filter until it comes through clear.

Belladonna, Alkaloidal Standard for Galenical Preparations of. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) Regarding the green extract of belladonna, it is stated in Chattaway's "*Digest of Researches and Criticisms on the B.P.*" that "a standard of 1 per cent. (of atropine) would appear to be reasonable," various authorities being quoted, amongst others, Farr and Wright. Farr and Wright's more important recommendation that this extract should be replaced by an alcoholic extract of the leaves, they having found a yield of 2·86 per cent. of alkaloid in an extract so prepared, as compared with 0·98 per cent. from a B.P. green extract, is ignored. Belladonna leaves vary in alkaloidal content from 0·24 to 0·6 per cent., the average being about 0·35 per cent., and, if we assume a yield of 3 to 3½ oz. of extract from a pound of leaves, a reasonable standard would fall between 1·5 and 2 per cent. In view, however, of the very low standard of 1 per cent. adopted for the root extract, it is probable that a higher figure for the leaf extract would be objected to. Why not increase the strength of the root extract? It is unreasonable that there should only be the difference of 0·25 of alkaloid between the liquid and the solid extracts.

Bismuth Salts and Alkaline Iodides, Incompatibility of. — Debono. (*Journ. Pharm. Chim.* [6], **19,** 436, after *Bull. Pharm. du Sud-Est.*) Notwithstanding the well-known chemical reaction between bismuth salts and alkaline iodides, and the fact that the bismuth iodide formed liberates free iodine

in the acid gastric juice, prescriptions are occasionally met with in which such combinations as bismuth subnitrate and potassium iodide are ordered together. When such is the case, sufficient sodium bicarbonate, say 60 grs. for a 6-oz. mixture, should be added, to neutralize the acidity of the gastric secretion. Such an addition will in no way interfere with the therapeutic action of the drugs prescribed.

Boroglycerin Suppositories. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 400.) Gelatin, 12; boric acid, 8; glycerin, 50; water, q.s. To the gelatin in suitable tared dish add water, 30, and heat on the water-bath until the gelatin is dissolved. Then add the boric acid and the glycerin, and heat until dissolved. Add enough water to make the weight 100, and pour into suitable moulds.

Bromidia. (*Pharm. Spezialit. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 505.) Potassium bromide, chloral hydrate, of each, 25 Gm.; extract of henbane, extract of Indian hemp, of each, 0·25 Gm.; extract of licorice, 2·5; oil of orange peel, 5 drops. Distilled water to make 125 Gm. Mix; allow to settle, and filter. Dose, 1 dr. as a hypnotic, not more than 3 times daily.

Bromipin Emulsion. —Spratling. (*Merck's Report*, **17,** 42.) Bromipini, 1 oz.; syrupi simpl., 1 oz.; spirit. menth. pip., 1 dr.; mucil. acaciæ ad., 4 oz. 1–3 tablespoonfuls to be taken after each meal.

Caffeine Citrate, Preparation of. G. F. Merson. (*Pharm. Journ.* [4], **18,** 8.) There is no need whatever to use water in the preparation of caffeine citrate. All that is necessary is to mix the alkaloid with the citric acid, sift through a No. 40 sieve, dry on the "granulating tray" or on a water-bath, powder and sift. The product is superior in appearance to that made by the official process, and is infinitely less trouble to prepare. In making by the official process, the salt turns yellowish on the surface when drying on the water-bath, and becomes as hard as a brick, giving much trouble in reducing to fine powder.

Calcium Sulphichthyolate, Preparation of. J. M. A. Helgland. (*Pharm. Weekblad*, through *Nat. Drugg.*, **33,** 320.) Dissolve ammonium sulphichthyolate, 100 Gm., in 100 c.c. of distilled water, and add the solution, under constant and active

agitation, to one of calcium chloride, 20 Gm., dissolved in 200 c.c. of solution calcium hydrate. After the precipitation caused by the mixture of the two solutions has ceased, which will be at the expiration of several hours, pour off the liquid, thoroughly wash the precipitate with distilled water, using two changes of water for the purpose, and dry in the water-bath. The resultant calcium sulphichthyolate is a chocolate-brown powder, retaining the unpleasant smell and taste of its constituents. These may be removed by shaking out in petroleum ether or benzin, and getting rid of the odour of this substance by careful evaporation. The yield is about 25 per cent. of the ichthyol used in the preparation. If about 20-25 per cent. of chocolate or cacao be added to the sulphichthyolate, it may readily be moulded into tablets.

Calisaya Elixir. (*Pharm. Spezial. vom Luxemburg. Apothekerverein.* through *Pharm. Zeit.*, **49,** 505.) Crushed star-anise fruit, powdered cochineal, crushed caraways, cardamoms, of each, 7·5; crushed corianders, cinnamon, of each 30; crushed dried bitter orange peel, 60; crushed Calisaya bark, 120; distilled water, 1,500; brandy, 12,500; alcohol, 500. Macerate for 8 days, strain, press, and add to the product hot simple syrup, 1,250, and filter while warm. Dose, a liqueur glassful 3 times a day.

Capsicum, Compound Liniment of. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 505.) Solution of ammonia (sp. gr., 960), oleobalsamic mixture, spirit of camphor, compound liniment of camphor, of each, 150; tincture of capsicum, 100; alcohol 90 per cent., 300; burnt sugar solution, q.s. to tint.

[The oleobalsamic mixture in the above is thus composed: Lavender oil, 1; eugenol, 1; cassia oil, 1; thyme oil, 1; lemon oil, 1; essential oil of nutmeg, 1; Peruvian balsam, 4; alcohol 90 per cent., 240 parts, by weight. Let stand for several days in a cool place and filter.—Ed. *Year-Book.*]

Castor Oil, Aromatic. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 586.) Coumarin, 0·01; saccharin, 0·50; vanillin, 0·10; absolute alcohol, 5·40; lemon oil, 5·0; peppermint oil, 1·0; neroli oil, 1·0; castor oil, q.s. to make 1,000 parts by weight.

Catheter Lubricant, Modified, Krause. P. L. Marsden.

(*Pharm. Journ.* [4], **18,** 803.) Powdered tragacanth, 15; glycerin, 50; distilled water, 500; phenol, 5, or salicylic acid, 0·50.

Chamomile Flowers, Contribution to the Pharmacy of. H. G. Greenish. (*Pharm. Journ.* [4], **18,** 878.) After a detailed historical sketch of the history of the chemical investigation of chamomile flowers, the results of pharmaceutical experiments are recorded. The action of various solvents on the drug was tried, with a view to selecting the most suitable for pharmaceutical preparations. It was found that the employment of heat had a marked deteriorating effect, prolonged heating in aqueous solution completely destroying the bitter principle, anthemic acid, which is of a glucosidal nature. Finally, alcohol 70 per cent. was selected as the most suitable menstruum, a valoid fluid extract being prepared, the weaker percolates of which were concentrated to the requisite volume by rapid distillation under partially reduced pressure (150 mm.). The fluid extract thus obtained was of a reddish-brown colour, and had an agreeable aroma, with an intensely bitter taste. Since this bitterness was so pronounced that it might militate against the use of the drug, a portion was concentrated *in vacuo*, then evaporated to an extract consistent on the water-bath. It remains to be seen if these preparations retain their bitterness on keeping. If decomposition of the bitter principle occur, this may possibly be obviated by neutralizing free acid present with an alkali.

Chocolate Pastilles or Tablets: "Trochis-cacao." (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 393.) The following general formula for chocolate tablets or "trochis-cacao," for mixtures of medicinal substances with cacao powder and sugar, flavoured, and divided into forms weighing 0·3 to 1 Gm., is suggested for adoption in the National Formulary. The medicinal agent is triturated with the powdered sugar, the mixture incorporated with about five-sixths its weight of cacao powder, and heated in a cassirole on the water-bath until a soft mass is obtained, if necessary, by the addition of a few drops of syrup. The soft mass is placed on a pill tile, rolled to a proper thickness, and cut into the required number of equal parts with a spatula or troche cutter. When cold, the tablets are wrapped in paraffin paper.

Cinnamon, Tincture of. F. H. Alcock. (*Pharm. Journ.* [4], **17,** 916.) The proportion of volatile oil and resin present

in the residue of this tincture forms an important guide as to its quality. This may be determined by directly shaking out with $CHCl_3$. If 5 c.c. of the tincture be mixed and agitated with 5 c.c. of chloroform, speedy separation follows after a few minutes' rest, and the lower layer, when clear, on removal to a thin, flat-bottomed, shallow glass or porcelain dish, and left to evaporate spontaneously, yields a varying quantity of substances of an agreeable odour (if the sample is a good one), and weighs about 1 5 to 1/10 of the solids left behind in the liquid in the separator. These can easily be removed and evaporated at a low temperature, and are found to be almost entirely free from cinnamon odour. The chloroformic residue does not seem to vary much in weight after the chloroform has volatilized, for on keeping it over sulphuric acid for 12 hours the loss was only 1 Mgm. One experiment was tried, using 5 c.c. of water in addition to the above, but an inseparable thick emulsion of a pale straw colour was obtained, which required 5 c.c. of alcohol and 5 c.c. more of chloroform to bring it back to the separation point, so that it is best to omit water in the test. A specially prepared sample gave the following figures: Sp. gr., 0·9025; total of solids, 2·62 Gm. per 100 c.c., of which 2·30 Gm. represented solids not soluble in chloroform, and 0·32 Gm. soluble in that menstruum.

Citric Acid to Prevent Precipitation of Certain Tinctures. F. Gay. (*Bull. de Pharm. du Sud-Est*, through *Journ. de Pharm. d'Anvers*, **59,** 144.) A solution of citric acid in an equal weight of 90 per cent. alcohol is recommended to prevent the precipitation of certain tinctures which are often prescribed together in Continental pharmacy, e.g. tinctures of rhubarb and cinchona; tinctures of rhubarb and calumba; tinctures of gentian, calumba, nux vomica, and cinchona; tinctures of star-anise, gentian, nux vomica, and balsam of tolu; tinctures of star-anise, ipecacuanha, and nux vomica; tinctures of grindelia, drosera, and ipecacuanha. All these give, in the ordinary way, copious precipitates when mixed. The addition of a little of the above alcoholic solution enables them to be compounded so as to form perfectly clear mixtures.

Coca, Liquid Extract of, Alkaloidal Standard for. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) Moor suggests that the total alkaloids in the liquid extract should be at least 0·5 per cent. The standard should be based on cocaine, which is the most important

constituent, and, as the leaves contain from 0·42 to 0·8 per cent. of that alkaloid, 0·5 of cocaine would be a rational figure.

Cod-liver Oil, Aromatic. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 506.) Coumarin, 0·01; saccharin, 0·50; vanillin, 0·10; absolute alcohol, 5·4; lemon oil, 5·0; peppermint oil, 1·0; neroli oil, 1·0; cod-liver oil, q.s. to make 1,000 parts by weight.

Cod-liver Oil Emulsion. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, 49 505.) Cod-liver oil, 150 Gm.; powdered gum acacia, powdered gum tragacanth, of each, 4 Gm.; oils of winter green, bitter almonds (free from HCN), cinnamon, of each, 2 drops; calcium glycerophosphate, 4·5 Gm.; sodium glycerophosphate, 50 per cent., 4·0 Gm.; glycerin, 50 Gm.; distilled water, 140 Gm. Mix to an emulsion. Two or three tablespoonfuls daily before meals.

Cod-liver Oil with Ferrous Iodide. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 506.) Iodine, 1·7; ether, 5·0; iron filings, 1·0; after action has ceased, add cod-liver oil, q.s. to make 1,000 parts by weight. Let stand 8 days and filter.

Colchicum, Alkaloidal Standard for Galenical Preparations of. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) Schultze states that the corms contain only two-thirds the alkaloids of the seeds. As a general statement this cannot be accepted. The seeds contain from 0·32 to 0·8 per cent., and the corms 0·3 to 0·75 per cent. of colchicine, the average in each case being over 0·5 per cent., so that difference in the alkaloidal values need not be taken as an excuse for rejecting the corms. On the basis of these figures standards might be adopted for the tincture, wine, and extract, that suggested for the first being 0·1 per cent. of colchicine, which is higher than the 0·75 per cent. recommended by Barclay.

Cold Cream, An Ideal. (*Amer. Drugg.*, **43,** 167.) In a porcelain or enamelled dish put: White wax, 12½ troy oz.; liquid paraffin, 48 oz.; dissolve on the water-bath. To this add a solution of borax, 5 drs., in distilled water, 24 fl. oz. Stir constantly until nearly cold, then add, with continued stirring, oil of geranium, 40 ♏. The stirring is best done with an egg-beater,

Copraol, A New Suppository Basis. (*Pharm. Zeit.*, **48,** 816.) A purified, odourless, and tasteless coco-nut oil has been introduced in Germany as a substitute for cacao butter as a basis for suppositories and pessaries. It is claimed to be superior to that substance for the purpose, and has a slightly higher melting-point. It may be incorporated with as much as 50 per cent. of an aqueous solution by shaking during cooling, the mixture being transferred to the moulds when just pourable. In summer, suppositories may be made with it without the use of ice for cooling. It is recommended to be melted in a flask by standing in hot water, then shaken with the medicament, and poured into the moulds in the usual manner. It sets to a firm mass much more quickly than cacao butter, and artificial cooling is only necessary, in the height of summer, when the mass contains 30–40 per cent. of glycerin or ichthyol, or a similar fluid. Soluble salts should be dissolved in water and then shaken with the melted copraol; insoluble substances, in fine powder, are merely suspended in it, being previously rubbed down with a little of the copraol in shavings. Tannin should not be dissolved in water previous to mixing, since it is then apt to form a viscous, separating mass. As a rule, a batch of suppositories may be made in 10 to 20 minutes when copraol is used.

Cosmetic Jellies. J. V. Dion. (*Amer. Soap Journ.*, through *Nat. Drugg.*, **34,** 105.) 1. Starch, 30; mucilage of Irish moss, 480; boric acid, 15; glycerin, 240; Cologne water, 240. Boil the starch in the mucilage, add the boric acid and the glycerin. Let cool and add the Cologne water.

2. Linseed mucilage, 240; boric acid, 2; salicylic acid, 1·3; glycerin, 60; Cologne water, 120; rose water, 120. Instead of Cologne water any extracts may be used. Lilac and ylang-ylang are recommended.

Crayons and Bougies, Basis for. P. Mounier. (*Bull. Comm.*, **32,** 132.) The following formula gives a basis at the same time firm and supple: Cacao butter, 25; white beeswax, 15; anhydrous woolfat, 10; gelatin basis, 50–60. Melt together at a gentle heat, stir until nearly cold after adding the prescribed medication, and run into paper moulds when about the consistence of honey; care must be exercised that the mass be not too fluid when pouring out or it will separate on cooling. The bougies or crayons thus made will keep indefinitely in a dry place. They readily disintegrate, however, in water at 37°C.

Creosotal Emulsions. H. Haefelin. (*Pharm. Zeit.*, **49,** 191.) Creosotal may be emulsified for dispensing by shaking it with equal weights of powdered gum acacia and tincture of quillaia.

An emulsion may be prepared as follows : Creosotal, 3 ; mucilage of acacia, 12 ; oil of sweet almonds, 8 ; and quillaia tincture, 3, are thoroughly emulsified by agitation in a bottle ; syrup of licorice, 40, is then incorporated, followed by sufficient water to produce 120 parts.

If preferred, the creosotal may be emulsified as above with quillaia and mucilage, then diluted with sweet or bitter milk of almonds instead of the almond oil emulsion, and flavoured with syrup and cognac. This gives a preparation which is readily taken by children.

Creosote, Rectal Injection of. (*Journ. Pharm. Chim.* [6], **18,** 96, after *Bull. Gén. de Thérap.*) Creosote, 2 Gm. ; almond oil soap, 2 Gm. ; yolk of 1 egg ; water to make 500 c.c. Rub down the creosote with the soap and a little warm water. When cold, emulsify with the egg yolk and make up to 500 c.c. with more water. Creosote is very soluble in soapy solutions. The yolk of egg is added merely to modify the caustic action of the creosote.

Dental Nerve-killing Paste. — Baldock. (*Nat. Drugg.*, **34,** 107.) Arsenious acid, 4 ; morphine sulphate, 2 ; clove oil, 1 ; creosote, q.s. to make a paste. Mix, etc.

After the nerve is destroyed the following paste is to be put in the cavity : Alum, 1 ; thymol, 1 ; zinc oxide, 1 ; glycerin, 1 part. Mix.

Dermatological Preparations, Modern. (*Report Nat. Form. Committee ; Proc. Amer. Pharm. Assoc.*, **51,** 394.) The following formulæ is suggested for adoption as being typical of the preparations prescribed by modern dermatologists : —

Pastes : *Pasta Zinci, Lassar* (*Zinc-salicyl*). Acid salicylic, 2 ; zinc oxide, 24 ; starch, 24 ; white petroleum, 50 parts.

Pasta Resorcini mitis, Lassar. Resorcin, 10 ; zinc oxide, 24 ; starch, 24 ; liquid paraffin, 40 parts.

Pasta Naphtholi, Lassar. Naphthol, 10 ; precipitated sulphur, 50 ; petrolatum, 20 ; soft soap, 20 parts.

Pasta Zinci mollis, Unna. Zinc oxide, 24 ; precipitated chalk, 24 ; mix and incorporate slowly liniment of lime, 50 parts.

Pasta Ichthyoli, Unna. Ammonium ichthyol, 10; distilled water, 10; glycerin, 10; dextrin, 10 parts.

Pasta Zinci sulphurata, Unna. Zinc oxide, 15; precipitated sulphur, 10; kaolin, 5; benzoated lard, 70 parts.

Pasta dextrinata. Dextrin, glycerin, water, equal parts by weight. Dissolve by heat; add water to make up to original weight. This is a general basis for many medicated pastes.

Pasta Kaolini; Glyceroplasma Kaolini. Kaolin elutriated and dried, 100; glycerite of boroglycerin, 20; methyl salicylate, 1; thymol, 1; glycerin to make 200 parts by weight or sufficient to make a semi-solid paste.

Glycerogelatins: *Glycerogelatina Acid. Salicylic.* 10 *per cent., Unna.* Gelatin, 10; glycerin, 45; distilled water, 35; salicylic acid, 10 parts.

Glycerogelatina iodoformi, 10 *per cent., Unna.* Gelatin, 5; glycerin, 20; distilled water, 65; iodoform, 10 parts.

Glycerogelatina Zinci dura, Unna. Gelatin, 15; distilled water, 45; glycerin, 24; gradually add levigated zinc oxide, 10; glycerin, 15 parts. Then mix in enough water to make 100 parts by weight. The softer form, *Glycerogelatina Zinci mollis*, is prepared in the same way, using gelatin, 10 parts.

When applied, these preparations are melted and then painted on the affected parts.

Salve Mulls or Steatins: These are ointments of high melting point, which are melted and spread, in a plaster form, on muslin or coarse porous cloth. They are composed of any suitable basis, and may be medicated with almost any drug desired. The following are most frequently prescribed:—

Unguentum extensum Hydrargyri bichloridi. Mercuric chloride, 2; alcohol, 50 parts; dissolve. Benzoated lard, 50; benzoated suet, 900 parts; melt together, then incorporate the alcoholic solution.

Unguentum extensum Hydrargyri subchloridi. Calomel, 10; benzoated lard, 20; benzoated suet, 70 parts.

Dilute Acids and Alkalies of the B.P. R. C. Cowley and J. P. Catford. (*Pharm. Journ.* [4], **17,** 619.) It is suggested that there should be a simple relative ratio between the strengths of the dilute acids and the alkaline solutions official in the Pharmacopœia.

Disinfectant Solution. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 397.) Cresol, 500; rosin, 300; caustic

potash, 45; water to make 1,000 parts. Heat the rosin in the cresol until it is dissolved; dissolve the potash in a little water; add to the rosin solution and boil until it has become clear; cool and add enough water to make final weight 1,000 parts.

Easton's Syrup, Modification of the Process for. G. E. Perry. (*Pharm. Journ.* [4], **18,** 469.) To prevent the darkening in colour and decomposition which occurs on storing this preparation, it is suggested to prepare separate solutions of iron phosphate and the other ingredients, mixing them shortly before use, thus :—

1. Iron, in wire, 150 grs.; concentrated phosphoric acid, $2\frac{1}{2}$ fl. oz.; distilled water, $2\frac{1}{4}$ fl. oz. Place in flask and apply gentle heat until the iron is dissolved. Cool, make up to 5 fl. oz. and filter.

2. Strychnine, in powder, 10 grs.; quinine sulphate, 260 grs.; syrup, 28 fl. oz.; concentrated phosphoric acid, 2 fl. dr.; distilled water, to 35 fl. oz. Rub the strychnine in a glass mortar with a little of the water, add the acid and triturate until solution is effected. Transfer to half-pint glass measure, add more water, then the quinine, and stir until dissolved. Make up with water to 7 fl. oz., and pour into the syrup. To this add chloroform, 20 ♏; S.V.R., 40 ♏ (mixed). Shake well, and finally filter through coarse paper. One volume of the iron solution and 7 volumes of this solution make Easton's Syrup.

Epithol Varnishes. —Strauss. (*Merck's Report,* **17,** 63.) *Epithol Gold Varnish.* Camphor, 2; epithol gold, 10; collodion, 50 parts.

Epithol Silver Varnish. Epithol silver, 1; traumaticine, 5 parts. These varnishes are specially efficacious in sycosis and folliculitis barbæ. Where a soluble varnish for application to an extended area is required, the following may be prescribed: Epithol gold, 5; dextrin, 10; distilled water, 30 parts.

Ergot, Dialyzed Extract of. (*Supplement to Dutch Pharmacopœia,* **1902,** through *Pharm. Post,* **36,** 595.) Powdered ergot, 100, dried at 30°C., is rendered fat-free by percolation with petroleum ether. The residual powder is again dried at 30°C., packed in a percolator, and extracted with alcohol, 300. [The alcoholic percolate is rejected.] The marc is pressed, mixed with warm water, 100, allowed to stand for 24 hours, then again packed in a percolator and exhausted by percolation with water. The

filtered aqueous percolate is evaporated to 100 parts. After adding 1 part of chloroform, it is transferred to a dialyzer, and dialyzed into water containing 0·5 per cent. of chloroform, which is frequently renewed, until the dializate gives no precipitate with tannin. The bulked dializates are then evaporated on the water-bath to a thick extract.

Ethereal Oil. J. W. Brandel. (*Proc. Amer. Pharm. Assoc.*, **51,** 263.) The author comments on the unsatisfactory yield of ethereal oil obtained by the official U.S.P. process, the indefinite nature of the product, and the resulting unsatisfactory and uncertain composition and therapeutic value of the Hoffmann's anodyne prepared from it.

It is found that by allowing the acid alcohol mixture to stand for 48 hours instead of 24 hours before distilling, a better yield, 0·7 per cent., containing also more diethyl sulphate, 47·03 per cent., was obtained. Also, after the mixture had been raised nearly to the initial boiling point, an accident delayed the process of distillation for an hour, which may also have contributed to the higher yield. If diethyl sulphate be the physiological active principle, it is evident that it can be better and more economically prepared than by this method. Also, the determination of that ester, by saponification, might indicate the value of the commercial article. Of three commercial specimens examined, one showed 50·4 per cent., the second 24·8 per cent., of diethyl sulphate, and the third none.

Eunatrol Mixture. (*Merck's Report*, **17,** 68.) The value of pure sodium oleate or "eunatrol" as a cholagogue and disintegrant of cholesterin concretions (gall stones) has been established. It is best prescribed in the form of pills in doses of 12–15 grs. thrice times daily, or in the following mixture: Eunatrol, 150 grs.; essence of pineapple, 20 ♏; tincture of valerian, 1½ drs.; peppermint water, 5 fl. oz. One tablespoonful to be taken from twice to six times daily, as required.

Evaporating Basins of Aluminium Bronze. E. W. Lucas. (*Pharm. Journ.* [4], **17,** 432.) The use of aluminium bronze in place of the costly platinum dishes usually employed is advocated for such purposes as determining the weights of extractives by evaporation. Four such bases, after constant use for 4 months, have only shown a loss of weight of 2 Mgm. in the lowest, and 9 Mgm. in the highest. Apart from their cheapness,

the high rate of conductivity, 300, compared with that of platinum, 70, and porcelain, 1, renders them specially suitable for evaporating and drying purposes.

Fetron (*Pharm. Centr.*, **45**, 219) is a new compound ointment basis which is stated to combine the protective properties of vaseline with the absorbability of lanoline. It contains 3 per cent. of stearic acid anilide.

Fluid Extracts, Acetic Acid as a Menstruum for. J. P. Remington. (*Proc. Amer. Pharm. Assoc.*, **51**, 207.) As the result of extended experiment with acetic acid as a menstruum for the preparation of fluid extracts, the following advantages over alcohol are claimed for it. Although in most cases the total extractive is slightly higher with acetic acid than with alcohol, and there is some precipitate in a few hours after the extract is made, but after being decanted the acetic fluid extract remains clear and does not continue to deposit. The deposit contains none of the active principles of the drug. The use of acetic acid renders fine disintegration of the drugs for percolation unnecessary, since it has much greater penetrating power than alcohol. Leaves may be treated whole, roots merely require coarse powdering, and barks crushing. This materially lessens the cost to the manufacturer, in addition to the great difference in the initial cost between spirit and acetic acid. Acetic fluid extracts are found to be precisely similar to those prepared with alcohol in medicinal effect, except that in some cases they are more potent. The taste of the acid, which as a rule does not exceed 6–8 per cent., is not noticeable when the dose is diluted. The acid extracts afford a good basis for diluting to tincture strength, and for making syrup or elixirs. When compounded in prescription they do not precipitate so much as the alcoholic preparations. They also have fewer incompatibles, except, of course, alkalies. Another advantage is the greater uniformity of strength, both of the menstruum and the active principles. The results of Squibb have shown that of the 88 drugs from which U.S.P. fluid extracts are made, 64 could be extracted entirely of their active principles with dilute acetic acid, and of the remaining 24, 5 could be extracted with strong acid. The author, in discussion, stated that glacial acetic acid was found to be a suitable menstruum for extracting resinous drugs.

Formulary of the Pharmaceutical Society of Antwerp, Selections from. (*Journ. Pharm. d'Anvers*, **59**, 132.) *Iodised Collodion.* Iodine, 5; collodion, 95 parts. Mix.

Phenolised Collodion. Phenol, 2; collodion, 98 parts. Mix.

Salicylic Acid Collodion. Salicylic acid, 2; collodion, 98 parts. Mix.

Soap Solution of Cresol. Crude cresol, 1; soft soap, 1 part. Melt the soap on the water-bath and stir in the cresol. By cresol the "sharp oil" of the gas-works is intended.

Cresol Water. Soap solution of cresol, 1; distilled water, 9 parts. For disinfection ordinary water may be substituted for distilled water.

Licorice Water. Fluid extract of licorice, U.S.P., 3; water, 97 parts.

Carbolic Water. This formula was originally given containing 3 per cent. of phenol; but in conformity with the formula of the International Conference the strength has been now reduced to phenol, 2; distilled water, 98 parts.

Compound Elixir of Orange. Orange peel, 200; cassia bark, 40; potassium carbonate, 10; sherry, 1,000 parts. Macerate at 20°C. for 8 days, press, and add sufficient sherry to the liquid to bring the weight to 920. In this liquid dissolve extract of gentian, 20; extract of wormwood, 20; extract of menyanthis, 20; extract of cascarilla, 20 parts. Set aside to deposit and filter.

Spirit of Ants. Alcohol, 90 per cent., 70; water, 26; formic acid, sp. gr., 1·060–1·063, 4 parts.

Hebra's Spirit of Soap. Pure soft soap, 120; alcohol 90 per cent., 60; spirit of lavender, 3 parts. Dissolve and filter.

Granulated Glycerophosphate of Calcium. Calcium glycerophosphate, 50; simple syrup, 100; sugar in granules, 885 parts. Put the granulated sugar in a basin on the water-bath, gradually add the syrup in which the glycerophosphate has been rubbed down, stir until the mass is quite dry, and pass through a hair-sieve to separate the aggregated granules of sugar.

Granulated Glycero-Kola. Alcoholic extract of kola, 1; alcohol 90 per cent., 1; granulated glycerophosphate of calcium, 19 parts. Dissolve the kola extract in the alcohol, pour this upon the granules in a dish, stirring so as to evenly distribute the liquid. Place the dish on the boiling-water bath and stir until dry.

Oil of Chloroform. Olive oil, 3; chloroform, 1 part. Mix.

Granulated Kola. Alcoholic extract of kola, 1; alcohol, 90 per cent., 1; granulated sugar, 19 parts. Dissolve the extract in the alcohol, moisten the sugar (previously placed in a dish) evenly with the solution. Then transfer the dish to a boiling-water bath and stir the granules until they are dry.

Boudin's Arsenical Solution. Arsenious acid, 1; distilled water, 1,000 parts. Add the arsenic to water, 500, in a flask; boil until it is dissolved. When cold make up to 1,000 with more water.

Bonain's Anæsthetic Solution. Menthol, 3; crystalline phenol, 3; cocaine hydrochloride, 1 part. Warm the phenol and menthol until they liquefy; add the cocaine hydrochloride and stir until it is dissolved. The liquid becomes solid on cooling. It is insoluble in cold water, but very soluble in alcohol. Its alcoholic solution is caustic.

Acetone Solution of Coal Tar. Coal tar, 1; benzol, 2; acetone, 10 parts. Dissolve the tar in the benzol; add the acetone and filter.

Credé's Colloidal Silver Ointment. Colloidal silver (collargol), 3; distilled water, 1; white wax, 2; benzoated lard, 7 parts.

Hebra's Ointment. Lead plaster, 1; olive oil, 1 part.

Compound Rosemary Ointment. Lard, 25; yellow wax, 5; concrete oil of mace, 2 parts. Melt together and add oil of rosemary, 1; oil of juniper, 1 part.

Rhubarb and Cinchona Pills (*King's Pills*). Powdered cinchona bark, 1; powdered aloes, 1; extract of rhubarb, 1; extract of taraxacum, 1 part. Mass.

Liquid Tar Soap. Norwegian tar, 1; Hebra's spirit of soap, 3 parts. Mix.

Liquid Cade Oil Soap. Cade oil, 1; Hebra's spirit of soap, 3 parts. Mix.

Liquid Ichthyol Soap. Ammonium ichthyol, 2; distilled water, 3; Hebra's spirit of soap, 15 parts.

Syrup of Phenol. Crystalline phenol, 1; syrup of peppermint, 999 parts. Mix.

Compound Bromoform Syrup (*Rami's Syrup*). Bromoform, 4; tincture of aconite, 4; codeine, 1; alcohol 90 per cent., 95; syrup of tolu, 1,400; syrup of red poppies, 500 parts. Mix.

Catechu Syrup. Tincture of catechu, 1; simple syrup, 9 parts. Mix.

Dionine Syrup. Dionine, 1; distilled water, 19; simple syrup, 1,980 parts. Mix.

Jaborandi Syrup. Tincture of jaborandi, 1; simple syrup, 19 parts. Mix.

Convallaria Syrup. Extract of convallaria, 1; distilled water, 4; simple syrup, 95 parts. Dissolve the extract in the water and mix.

Codeine Phosphate Syrup. Codeine phosphate, 3; distilled water, 17; simple syrup, 980 parts. Dissolve the codeine in the water and mix with the syrup.

Licorice Syrup. Incised licorice root, 4; dilute solution of ammonia, 1; water, 20 parts. Mix and macerate for 12 hours at 15–20°C. with frequent agitation; press, heat the liquid to boiling, then evaporate to two parts on the water-bath, add alcohol, two parts, allow to stand for 12 hours, then filter. Add to the filtrate enough simple syrup to bring the final weight to 20 parts.

Maize Stigma Syrup. Extract of maize stigmas, 1; distilled water, 4; simple syrup, 95 parts. Dissolve the extract in the water, filter, and add the syrup.

Ammonium Valerianate Solution, Pierlot's. Ammonium valerianate, 2; alcoholic extract of valerian, 1; distilled water, 47 parts.

Kola Tincture. Powdered kola nuts, 1; alcohol 60 per cent., 5 parts. Macerate for 6 days, press, and filter.

Bidet's Liquid Vesicant (*François' Formula*). Tincture of cantharides, tincture of rosemary, chloroform, equal parts.

Peptone Wine. Dried peptone, 1; Malaga wine, 19 parts. Dissolve without heat and filter after standing for several days.

Formulæ from the Formulary of Liverpool Royal Infirmary. P. H. Marsden. (*Pharm. Journ.* [4], **18,** 803.) *Catheter Lubricant, Chinosol, L.R.I.* Green soft soap, 8 oz.; glycerin, 6 oz.; water, 4 oz.; warm together, and when mixed add chinosol, 8 grs.

Collutorium Acidi Carbolici, L.R.I. (*Carbolic Mouth Wash*). Liquefied carbolic acid, 5 ♏; compound tincture of cardamoms, ½ dr.; glycerin, ½ dr.; water, to 1 pint.

Emulsio Iodoformi, L.R.I. Iodoform, 44 grs.; rectified spirit, 10 ♏; powdered tragacanth, 4 grs.; glycerin (by weight), 1 oz.

Lotio Rubra, L.R.I. Sulphate of zinc, 40 grs.; compound tincture of lavender, 6 drs.; water, to 1 pint.

Lotio Spiritus, L.R.I. Methylated spirit, 5 oz.; water, to 1 pint. Mix.

Mistura Antacida, L.R.I., Lock. Tincture of henbane, solution of potash, of each 15 ♏ ; spirit of nitrous ether, 12½ ♏ ; camphor water, to ½ oz.

Mistura Mentholis, L.R.I. Menthol, 1½ grs. ; compound tincture of cardamoms, rectified spirit, of each 24 ♏. Dissolve, and add chloroform water, to 1 oz.

Mistura "Neurasthenica," L.R.I., Lock. Tincture of valerian, tincture of asafetida, infusion of calumba, peppermint water, of each, 1 dr. (The name of this might be altered to *Mistura Valerianæ Composita.*)

Mistura Potassii Iodidi Composita, L.R.I., Lock. Iodide of potassium, 10 grs. ; acetate of potassium, 15 grs. ; aromatic spirit of ammonia, 15 ♏ ; infusion of buchu, to ½ oz. Mix.

Mistura Tonica, L.R.I., Lock. Solution of strychnine hydrochloride, 3 ♏ ; citrate of iron and quinine, 6 grs. ; sulphate of magnesium, 15 grs. ; infusion of quassia, to ½ oz.

Mistura Tonica Acida, L.R.I., Lock. Diluted nitro-hydrochloric acid, 10 ♏ ; compound infusion of gentian, to 1 oz.

Pasta Cubebæ et Copaibæ, L.R.I., Lock. Powdered cubebs, 1½ oz. ; copaiba, ½ oz. ; extract of henbane, camphor, of each ½ dr. ; treacle, a sufficient quantity to make a stiff paste. Dose : ½ dr. 3 times a day.

Spiritus Saponis Viridis, L.R.I. Green soft soap, 2 lb. ; Methylated spirit, 16 fl. oz.

Gelatin Capsules. (*Journ. Pharm. d'Anvers*, **59**, 223.) The following method is given as that which will be official in the approaching edition of the Codex : Sheet gelatin, 1, is macerated in cold water for 12 hours, then carefully drained. Glycerin, 2, is mixed with water, 1, and the mixture added to the gelatin, which is then melted on the water-bath, and evaporated to a suitable consistence. The moulds, which are formed of polished steel terminated by oval bulbs at one extremity, are fixed in a circle in a piece of flat wood ; they are then lubricated with a little vaseline oil and dipped in the melted gelatin. On withdrawing, the apparatus is rotated so as to diffuse the melted gelatin evenly over the surface of the moulds. These are then set aside in a cool place, and when, after a time, the gelatin has thoroughly set, the capsules are withdrawn from the moulds, the tags cut off close to the oval part, and the latter placed, orifices uppermost, in a wooden tray pierced with holes to receive them. They may then be filled with the prescribed medica-

ment by means of a glass syringe, the nozzle of which has been filed down. After filling, the orifice is closed by the application of a drop of the melted gelatin basis.

Gelatin for Silvering Pills. (*Schweiz. Woch. für Chem. und Pharm.*, through *Pharm. Zeit.*, **40,** 331.) A solution of gelatin in acetic acid is recommended as the adhesive in silver-coating pills. Gelatin, previously softened in water, 10, is dissolved with heat in acetic acid, 45, and evaporated to the sp. gr. 1·15. From 1 to 2 per cent. of alcohol is then added and the mixture allowed to cool. The pills are damped with this, in the proportion of 1–3 parts for every 4,000 parts by weight of pills, in the usual way by rotating, then transferred to the silvering vessel. Every 1,000 parts by weight of pills should not take more than 4–6 parts of silver leaf.

Gelsemium Tincture, Alkaloidal Standard for. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) Barclay proposes 0·025 per cent. of gelsemine as a standard for the tincture. Would the total alkaloids not be a safer basis? Stockman and Hill state that gelseminine is the constituent which chiefly determines the effect of gelsemium preparations, and Greenish that gelseminine is much more poisonous than gelsemine. The rhizome contains from 0·38 to 0·7 of total alkaloids, so that 0·5 per cent. might be regarded as a suitable standard, equal to 0·05 per cent. of total alkaloids for the tincture.

Germicide. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 398.) Thymol, 15 parts by weight; eucalyptus oil, 60; lavender oil, 60; alcohol 90 per cent., 800; water to produce 1,000 fl. parts.

Glycerin as a Pill Excipient. (*Journ. Pharm. d'Anvers*, **59,** 142.) Glycerin is recommended as an excipient for pills containing essential oils, oleoresins and certain chemical salts, thus: (1) Sandal wood oil, 1; glycerin, 1; powdered licorice root, 2. (2) Turpentine oil, 1; glycerin, 1; powdered licorice root, 2·5. (3) Maracaibo copaiba balsam, 2; glycerin, 1·5; powdered licorice root, 3·5. (4) Para copaiba balsam, 2; glycerin, 1·5; powdered licorice root, 4. (5) Creosote, 2; glycerin, 1; powdered licorice root, 4·5. (6) Where two substances are prescribed in the same pill, the quantity of glycerin requisite for each is calculated; thus, sandal oil, 30 grs.; balsam copaiba, 15

grs. ; divide into 30 pills. The balsam requires 10 grs. of glycerin, and the sandal oil 30 grs. This quantity is added with sufficient licorice powder to mass. (7) Extract of male fern, 2 ; glycerin, 1 ; powdered licorice root, 2·5. (8) Phenol in crystals, 2 ; glycerin, 1 ; powdered licorice root, 4·5. (9) Ichthyol, 1 ; glycerin, 1 ; powdered licorice root, 2·5. (10) Crystalline ferric chloride, 2 ; glycerin, 1 ; powdered licorice root, 3.

Glycerin of Pepsin. P. Boa. (*Pharm. Journ.* [4], **18,** 84.) Since pepsin is readily soluble in the amount of water prescribed in the official formula, it is preferable to first dissolve it in that solvent, and not to add it, as directed, to the mixed acid, glycerin and water. A solution is thus obtained in a few minutes. The direction for subsidence and decantation are also criticized since the precipitated matter is not found to separate in the prescribed time of one week. After decantation, the directions to make up the volume with water is also likely to lead to difference in strength, since the " bright fluid " decanted will not be constant in volume. The strength is also regarded as too high ; according to the official requirements for pepsin, the amount of the ferment in an official dose should be sufficient to dissolve 28 oz. of hard-boiled white of egg. A reduction of the pepsin strength would make the preparation less dense ; if the pepsin be then directed to be dissolved first in the water, the other ingredients being added, the final volume could be at once adjusted, and the preparation might be used, for most purposes, at once.

Glycerin Suppositories. T. Lothian. (*Pharm. Journ.* [4], **18,** 583.) The following modification of the official formula is suggested to obviate the necessity for evaporation : Distilled water, 2 ; gelatin, 1 ; glycerin, 5 parts. Dissolve the gelatin in the water on a water-bath, warm the glycerin to the same temperature, add and mix. The percentage of glycerin in the finished mass is about 69.

Glycerinum Acidi Borici. G. Lunan. (*Pharm. Journ.* [4], **18,** 7.) The following process is suggested as being more satisfactory than the official method, giving a white product without difficulty, which is not too viscous to manipulate : Nineteen oz. of glycerin by weight is heated to 100°C., 5 oz. of boric acid, in crystals, added and dissolved, the temperature raised to 118°C., when ebullition begins ; boiling continued for 40 minutes, when the product weighs 20 oz.

Glycerinum Sodii Cinnamatis. P. H. Marsden. (*Pharm. Journ.* [4], **18,** 803.) Sodium cinnamate, 5; glycerin, 95. Rub the salt to a fine powder and incorporate with the glycerin, transfer to a flask, the mouth of which is plugged with cotton wool. Heat upon a sand-bath until solution is effected, the temperature required being 180°C. Transfer to bottles which have been sterilized.

Glycerophosphates, Compound Syrup of. — Siboni. (*Formulary of Nouv. Remèdes* [3], **20,** 2.) Dissolve calcium glycerophosphate, dried at 110–120°C., 27·4 Gm., in distilled water, 250 c.c., and lactic acid, 8·8 Gm. Dissolve sodium sulphate, 4·04 Gm.; potassium sulphate, 2·07 Gm.; ferrous sulphate, 4·66 Gm.; quinine sulphate, 4·10 Gm.; strychnine sulphate, 42 *millegrammes* in 100 c.c. of distilled water. Mix the two solutions, set aside for 24 hours, and filter out the precipitated calcium sulphate. In the filtrate dissolve 775 Gm. of white sugar and add sufficient water to make the volume 1,000 c.c. Each 10 c.c. of the syrup will then contain 0·05 Gm. of neutral calcium glycerophosphate, and of the acid glycerophosphate of sodium, potassium, iron and quinine; with $\frac{1}{2}$ *millegramme* of strychnine glycerophosphate and 0·10 Gm. of calcium lactate.

Granular Effervescent Preparations. J. Lothian. (*Pharm. Journ.* [4], **18,** 583.) Attention is drawn to the fact that in all the official formulæ the ratio of citric to tartaric acid is practically 1 : 1·5. This is said to be undesirable, since in the case of the effervescent sodium citrotartrate there is no added ingredient in the mixture, and the fusion mass is too soft; while in the case of the preparations of effervescent magnesium sulphate and of sodium sulphate there is a considerable amount of dry matter added with the result that the masses are not sof enough to granulate easily.

Guaiaco-Saponin Emulsions. W. Frieboes. (*Merck's Report,* **17,** 88.) On the grounds that it has absolutely non-toxic properties the saponin of guaiacum is recommended for use as an emulsifying agent. The following formulæ are said to give satisfactory emulsions:—

Cod-liver oil, 25; gum acacia, 12·5; distilled water, 200; guaiaco-saponin, 1 part.

Castor oil, 20; gum acacia, 10; distilled water, 160; guaiaco-saponin, 2·5 parts.

Gum Acacia, Incompatibility of, Due to its Oxidizing Ferment. E. Bourquelot. (*Journ. Pharm. Chim.* [6], **19**, 473, 524.) A very important point is raised by the author, since he demonstrates that although gum acacia is so widely used in pharmacy as an excipient or adjuvant, and has been generally regarded as an inert substance, it is far from being so. In consequence of the active oxydase it contains, in common with other gums and gum resins, such as myrrh, frankincense and bdellium, so far from being inert, it is a powerful oxidizing agent. As such, it is both therapeutically and chemically incompatible with many potent drugs, the physiological action of which it may profoundly modify. Although the oxidizing action of gum acacia on guaiacum mixture was observed as long ago as 1809 by Goettling, the precise nature of the action was not then comprehended, although Planche observed in 1820 that mucilage of acacia which had been heated was deprived of its oxidizing power, and it appears since to have been overlooked.

The author has investigated the subject, and finds that the gum brings about the decomposition of the following substances, many of which are widely used in medicine, and are constantly compounded with acacia preparations in pharmacy.

Chemical substances oxidized by gum acacia include phenol (carbolic acid), cresylol, ortho- and meta-xylenol, thymol, carvacrol, α- and β-naphthol, pyrocatechin; only three of the phenols tried did not appear to be profoundly altered; these were para-xylenol, hydroquinone and resorcin. Among the phenolic esters affected were guaiacol, acetyl-guaiacol, veratrol, creosol, eugenol, acetyl-eugenol and vanillin. Of the aromatic amines tried only aniline itself was unaffected. The following were decomposed: Methylaniline, ethylaniline, paratoluidine, xylidines, naphthylamine and veratrylamine. Other basic or nitrogenized bodies affected include pyramidone, morphine, apomorphine, adrenaline; as well as isobarbaloin, caffeotannic acid, gallic acid and tannin; commercial aloin containing much isobarbaloin is also affected. Among the *galenical preparations* with which gum acacia is incompatible are: all preparations of coal tar, creosote, lysol, creolin and various antiseptics derived from coal tar; all opium preparations, and those of calabar bean, of suprarenal capsules; aloetic compounds, tincture of guaiacum, and all substances flavoured with vanilla.

Extracts of cinchona, bistort, catechu, rhatany, rhubarb, kola, and fluid extract of viburnum prunifolium are also affected.

Gum acacia also destroys the colouring matter of certain plants, such as the mallow, violet and buckthorn, but not of the red poppy.

In some of the above cases the action may not be directly evident on the active principles, as for instance in the case of certain galenical preparations; but as it is not known how far the changes brought about may affect the physiological activity of the drug, the use of gum containing active oxydase should be avoided. In other cases the incompatibility is absolute. In the case of mucilage of acacia, the objectionable oxydase may be removed by heating for some time to 100°C. [Such heating would be quite unobjectionable; in fact, the mucilage so treated would keep better. It would be of pharmaceutical interest to determine if the emulsifying power of the gum be affected by the destruction of the ferment.—Ed. *Year-Book.*]

Gum Acacia to Prevent Precipitation of Incompatibles. A. Astruc and J. Robert. (*Bull. Pharm. du Sud-Est.*, through *Répertoire*, **66**, 109.) The presence of a little mucilage of acacia will often prevent the formation of a precipitate when two incompatibles are prescribed in a mixture. For instance, the Codex syrup of ferrous iodide, made with syrup of gum acacia, gives a clear mixture with cinchona wine; but if a syrup of ferrous iodide compounded solely with simple syrup be employed, a precipitate is formed. Extract of cinchona generally gives cloudy mixtures. These may be obtained bright by adding a little mucilage to the extract. After such addition no precipitate will be formed when it is mixed with such incompatibles as vegetable infusions, caffeine, antipyrine, exalgine, pyramidon camphorate, glycerophosphates, and other salts. The official (Codex) cinchona wine soon becomes cloudy after filtration; this may be obviated by adding 1 or 2 Gm. of gum acacia per litre. Mixtures of this wine throw down with other medicinal wines (or tinctures) such as rhubarb, kola, etc., but no precipitation occurs if it be previously mixed with 0·5–1 per cent. of gum acacia. The same occurs with many galenical preparations which show a tendency to deposit on standing. In the majority of cases, this may be obviated by the addition of 1 per cent. of the gum. In view of the inert nature of the addition, no objection can be made to it on therapeutic grounds. (*See preceding note.*)

Hæmalbumin Solution: Perdynamin. (*Pharm. Spezial. vom*

Luxemburg. Apothekerverein, through *Pharm. Zeit.*, **49**, 505.) Hæmalbumin (blood albumin), 30; distilled water, 650; dissolve with heat and add the following mixture: Tincture of vanilla, 5; arrac, 10; spirit of nitrous ether, 2; coumarin sugar (1 : 50), 0·2; elæosaccharide of bitter almond oil (1 : 50), 0·4; elæosoccharide of rose oil (1 : 50), 0·4; saccharin, 0·2; alcohol 90 per cent., 100; simple syrup, 200. Mix. One or 2 tablespoonfuls to be taken 3 times a day half an hour before meals.

Hæmoglobin Solution. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49**, 505.) Mix dry hæmoglobin, 80 Gm., with cold water, 420 Gm.; after standing for half an hour shake up and add the following mixture: Glycerin, 80 Gm.; distilled water, 125 Gm.; alcohol 90 per cent., 125 Gm.; simple syrup, 160 Gm.; tincture of orange, 4 Gm.; tincture of vanilla, 4 Gm.; aromatic tincture, 1 Gm.; tincture of cinnamon, 1 Gm.; acetic ether, 5 drops. Let stand for 3 days, then decant into bottles. One tablespoonful to be taken 3 times a day.

Hydriodic Acid, Permanent Syrup of. O. Raubenheimer. (*Proc. Amer. Pharm. Assoc.*, **51**, 384.) Potassium iodide, 16·6 Gm.; potassium hypophosphite, 0·5 Gm.; glycerin, 125 c.c.; distilled water, 50 c.c. Dissolve in a dispensing bottle and add to it the following solution. Tartaric acid, 15 Gm.; dilute alcohol 48·6 per cent., 50 c.c. Mix and stand on ice or in ice water for 2 hours. Meanwhile prepare a syrup from white crystal sugar, 500 Gm.; water, q.s. to make 700 c.c. Strain through flannel. If prepared warm this syrup must be first cooled. Into this syrup, by means of a long stemmed covered glass funnel, filter the cold solution, through white paper, disturbing the crystalline deposit as little as possible. Wash this with 25 c.c. of distilled water and pass through the same filter. Make up the final volume to 1,000 c.c. with water. Add a heaped teaspoonful of coarse, granular, pure animal charcoal, shake up well, and set aside for 2 days with occasional shaking. Then again filter through white paper in a covered funnel.

Ichthargan Ointment. M. Cohn. (*Merck's Report*, **17**, 103.) The following ointment has given good results in the treatment of furunculosis: Ichthargan, 5-10; distilled water 5; glycerin, 10; lanoline, 35; vaseline, 40 parts.

Iodoform and Salol Gauze. Leclair. (*Journ. Pharm. d'Anvers*, **58**, 407.) Thirty per cent. iodoform gauze may be prepared by the following process: Iodoform, in impalpable powder 30; glycerin, 30; solution of mercuric chloride (Codex), q.s.; gauze, free from dressing, 100 parts. Mass the iodoform with the glycerin, and gradually add sufficient mercuric chloride solution to thoroughly moisten the gauze. The iodoform should be in perfectly even suspension in the liquid. The gauze need not be wholly unrolled. It is worked about in the liquid until uniformly moistened, then drained, and partially dried in a dark place. When only just moist, it is wrapped in parchment paper. Salol gauze is prepared in a similar manner, after the salol has been dried in the stove, powdered, and sifted through a very fine silk sieve.

Iodo-tannin Syrup. Wyatt Wingrave. (*Brit. Med. Journ.* [1], **1904**, 724.) The following formula for *Syrupus Iodo-tannicus* has been devised by W. H. Martindale for the exhibition of iodine in the treatment of glandular enlargements and other diseases in which iodine is indicated. It forms a palatable preparation which is readily taken and well tolerated by children: Iodine, 5; tannic acid, 8 parts; alcohol 90 per cent., 76 fl. parts; syrup, q.s. to make 150 fl. parts. Dissolve the iodine in the alcohol; add the tannic acid and 60 fl. parts of the syrup; heat to just below boiling point until the solution affords no evidence of free iodine with the starch reaction (about 20 minutes). Cool and add the remainder of the syrup with flavouring. Each drachm contains 2 grs. of iodine. It may be given in doses of ½–2 drs. in water or wine before meals, according to age.

Iron Peptonate Elixir. Liquor Ferri Peptonat. Saccharat. (*Pharm. Spezial. vom Luxembury. Apothekerverein*, through *Pharm. Zeit.*, **49**, 505.) Iron peptonate, 25 per cent., 16 Gm.; distilled water, 550 Gm.; brandy, 75 Gm.; alcohol 90 per cent., 100 Gm.; simple syrup, 200 Gm.; aromatic tincture, 4 Gm.; tincture of vanilla, 4 Gm.; tincture of cinnamon, 4 Gm.; acetic ether, 5 drops; distilled water to make 1,000 Gm. Dose, a tablespoonful at meal times.

Iron Peptonate Scales. A. S. Johnson. (*Proc. Amer. Pharm. Assoc.*, **51**, 343.) Solution of ferric chloride, 65; solution of ammonia, 65; egg albumin, dried, 20; hydrochloric

acid (25 per cent. HCl), 34; pepsin, 1; distilled water, q.s. Dilute the solution of ammonia with water, 65; add it gradually to the solution of ferric chloride, stirring after each addition so that the precipitate at first formed is redissolved. Dilute with water to 2,000. Dissolve the egg albumin in water, 2,000, to which the pepsin and hydrochloric acid, 30, have previously been added. Let the mixture stand, with occasional agitation, at a temperature of about 40°C. Then cool to 20°C., filter or strain, and very carefully neutralize it with weak NaOH. Mix the iron and peptone solutions; neutralize with 1 per cent. NaOH solution; wash the precipitate formed; collect on strainer, then transfer to porcelain dish, dissolve in hydrochloric acid, 4, by heating on the water-bath at a temperature not exceeding 56°C. Then evaporate to a syrup at a temperature not exceeding 50°C., and scale on glass.

Iron Peptonate Solution with Manganese. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 399.) Dissolve iron peptonate, 45, in water, 250; add 13 fl. parts of solution of ammonia, and 150 fl. parts of alcohol 94 per cent.; dissolve manganese citrate, 8, in water, 150; add to the first solution, and to the mixture add aromatic elixir, 50 fl. parts, and water to make final volume 1,000 fl. parts.

Iron Peptonate Solution with Quinine. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 506.) Quinine hydrochloride, 5; distilled water, 50; dilute hydrochloric acid, q.s.; elixir of iron peptonate, q.s. to make 1,000 parts. One tablespoonful to be taken half an hour before meals.

Jaborandi, Alkaloidal Standards for Galenical Preparations of. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) Jaborandi leaves contain from 0·23 to 1 per cent. of pilocarpine, so that the liquid extract ought to contain at least 0·5 per cent. of that alkaloid, on which basis the tincture would contain 0·1 per cent., the standard suggested in Chattaway's *Digest of Criticisms* of 0·048 per cent. being too low.

Jalap, Resin Standards for, and its Galenical Preparations. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) Jalap root yields from 5 to 16 per cent. of resin, the average being 8 per cent., so that the B.P. requirement of 9–11 per cent. is rather high, apart from the recent deterioration of root to which Umney

has called attention. The tincture standard of 1·5 per cent. is more reasonable. The extractive (in a 1 in 1 fl. extract) varies from 12·5 to 24 per cent., and, assuming an average of about 20 per cent., the extract—which Hoseason recommends to be standardized—ought to contain not less than 35 per cent. of resin.

Kino Tincture, Gelatinization of. E. White. (*Pharm. Journ.* [4], **17,** 702.) D. Hooper has confirmed the author's results (*Year-Book*, **1903,** 282) with freshly-collected kino, and has isolated from an unofficial variety of kino derived from *Myristica gibbosa*, a tannin-free body having many oxydase properties.

In the *Agricultural Ledger* [11], **1900,** 381, reference is made to a method of collection adopted by J. G. F. Marshall, which is as follows: "A longitudinal cut is made with an axe or knife through the bark of the trees, down to the cambium, about 1½ ft. long, and side cuts are made to lead into this. A bamboo tube is then fixed at the bottom of the main incision in order to catch the juice. In the course of about 24 hours the flow of the gum ceases, and the bamboo is taken down. When several of these bamboo cups are nearly full they are taken to headquarters and emptied into a large cauldron, and the juice is boiled. During the boiling, the impurities, consisting of pieces of bark, wood and leaves, rise to the surface and are skimmed off. When sufficiently concentrated to the consistence of a thick extract, it is exposed to the sun, in thin layers, in shallow vessels, until it is dry enough to crumble to pieces. The kino is then weighed and packed away in wooden cases." Sufficient time has not elapsed to enable one to state that this method of preparation will yield a kino tincture which will not gelatinize; but in all probability this will be found to be the case. Meanwhile, the following formula for the tincture is suggested, and will enable kinos, not prepared in the manner described above, to be utilized for this preparation: Kino, 2 oz.; boiling water, 10 fl. oz. Add the kino to the water in a suitable vessel, and maintain the whole at or near the temperature of 100°C. for 15 minutes, agitating frequently. Allow to cool, replace the water lost by evaporation; add alcohol 90 per cent., 10 fl. oz., and set aside for 12 hours; then strain.

If the kino be fresh and of good quality it will almost entirely dissolve. In old samples more or less change, due to the action

of the oxydase, will have occurred, and a corresponding amount of insoluble matter will have been formed. If Marshall's method of collection fulfils the expectations formed of it, and the whole of the kino in commerce be collected in accordance with the directions quoted above, then the necessity for any special method of preparing the tincture will disappear, and a stable preparation will be obtained by simple solution in alcohol of the desired strength.

Kola Elixir. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 505.) Fluid extract of kola, 50; glycerin, 60; dilute alcohol, 60; Malaga wine, 500; simple syrup, 200; tincture of vanilla, 20; distilled water to make 1,000. A liqueur glassful to be taken 3 or 4 times a day.

Lead Acetate, Alkalinity of. Thomas S. Barrie. (*Pharm. Journ.* [4], **18,** 85.) This salt is stated, in the B.P., to be slightly acid to litmus. The author's experience is that it is often slightly alkaline, and it is suggested that the official description at this point should be: "Its solution in water may be slightly acid or slightly alkaline to litmus." The milkier the solution the more alkaline it is likely to be.

Lead Plaster. Lead Oleate. C. S. N. Hallberg. (*Proc. Amer. Pharm. Assoc.*, **51,** 259.) The author suggests the use of substitution of precipitated lead oleate for the lead plaster at present official in the U.S.P. (and B.P.), obtained by the tedious and laborious method of saponifying olive oil with litharge. The process proposed is as follows: Soap, dried and granulated, 100, is dissolved in hot distilled water, 350; lead acetate, 60, is separately dissolved in hot distilled water, 250, and filtered into the soap solution with constant stirring. The precipitated oleate is thoroughly washed with hot water, drained, kneaded, free from water on a warm slab, formed into rolls, wrapped in paraffin paper and preserved in light containers.

Lecithin Granules. (*Journ. Pharm. d'Anvers*, **66,** 49, after *Revist. Farm. Chil.*) Lecithin, 20; vanillin, 1; alcohol 90 per cent., 160; granulated sugar, 1,760. Dissolve the lecithin and vanilla in the alcohol, pour the solution evenly over the sugar, mix intimately, and dry in the air or at a low temperature.

Lecithin in Oily Solutions. — Ostruc and — Courtail. (*Répertoire* [3], **15,** 396.) The use of either olive oil,

oil of sweet almonds, or vaseline oil is recommended for the preparation of hypodermic injection of lecithin. With vaseline oil a 10 per cent. solution may be obtained, which remains permanently clear, but with olive oil and sweet almond oil a 5 per cent. solution becomes turbid on standing. If, however, these oils be first washed with alcohol and then sterilized at 110–115°C., the 5 per cent. solutions will remain clear for several days. If the proportion of lecithin be increased, the clear solutions become turbid on cooling. Consequently only alcohol-washed and sterilized almond and olive oils should be used to prepare 5 per cent. solutions, and vaseline oil for stronger preparations. In all cases vaseline oil preparations keep better than those prepared with the vegetable oils.

Licorice, Fluid Extract of, Comparison of the B.P. and U.S.P. Official Processes. P. Guigues. (*Journ. Pharm. Chim.* [6], **19**, 284.) The conclusion is arrived at that the method of the U.S.P. gives a fluid extract superior, if less dense, than that of the B.P. The flavour and odour of the American preparation are superior; although the British extract is apparently stronger, it is more acrid; moreover, it is markedly less rich in glycyrrhizin, containing only 14·16 Gm. of that body, whereas the U.S.P. extract contains 31·95 Gm. in the extract from 500 Gm. of the same root. Being a valoid, 500 c.c. of fluid extract are obtained from 500 Gm. of root by the U.S.P. process, whereas the yield by the B.P. method is only 165 c.c. The B.P. extract gives 36·35 per cent. of residue, the U.S.P. 18·30 per cent. The U.S.P. method is as follows: Powdered licorice root, 1,000 Gm.; solution of ammonia, 10 per cent., 50 c.c.; alcohol, 94 per cent., and water, of each, q.s. Mix the solution of ammonia with 300 c.c. of alcohol and 650 c.c. of water. Moisten the powder with 350 c.c. of the mixture, pack in a cylindrical glass percolator, add more menstruum to saturate the powder and to leave a liquid layer on the top. As soon as percolation commences, close the lower end of the percolator, and macerate for 48 hours. Then continue percolation, employing first the rest of the menstruum, then a mixture of alcohol, 300 c.c., and water, 650 c.c. Reserve the first 750 c.c. of percolate, evaporate the remainder, when percolation is complete, to a soft extract. Dissolve this in the reserved portion, and add sufficient of the mixture of alcohol and water to make the final volume 1,000 c.c.

Licorice, Fluid Extract of, Correction of Acidity in. W.

Lyon. (*Pharm. Journ.* [4], **17,** 401.) The acidity of the official preparation is a disadvantage, since it is frequently prescribed with carbonates. It is suggested that it should be neutralized with ammonia before adjusting to gravity.

Liquor Ferri Mangani Peptonati Triplex. (*Apoth. Zeit.*, **19,** 94.) Peptone (Witte's), 500, is dissolved in hot water, 5,000, and filtered while hot; solution of ferric chloroxide, 9,000, is then added in a thin stream. When the mixture has become clear it is neutralized with solution of ammonia (sp. gr. 0·960), 180; the resulting precipitate is washed, collected and pressed, then mixed in a covered enamelled vessel with simple syrup, 8,750, and solution of ammonia, 400. The whole is gently warmed on the water-bath until the iron peptonate has been taken up. A solution of citric acid, 300, in water, 750, and solution of ammonia, 750, is then added, and finally manganese citrate, 250. The mixture is then evaporated, with constant stirring to drive off the ammonia; when this is done the final weight is made up to 16,660. The result is liquor ferri peptonate triplex, which, when suitably diluted and flavoured with a little benedictine, gives a product suitable for use.

Liquor Ferri Perchloridi Fortis. D. B. Dott. (*Pharm. Journ.* [4], **18,** 85.) It has been pointed out by Tyrer and others (*Year-Book*, **1900,** 481) that the specific gravity and percentage of ferric oxide as stated in the official tests do not correspond. The usual custom seems to be to get the density right and allow the ferric oxide to be slightly deficient. The mistake will presumably be rectified in the next edition; but the tests appear to be otherwise faulty. Any one who had a readily available source of chlorine would undoubtedly peroxidize with it, and not with nitric acid. It would therefore be advisable to have a test for free chlorine. Probably boiling in a flask, fitted with a tube dipping into water coloured with indigo or other bleachable colouring matter, would be a suitable test. A sample was recently noticed which passed the B.P. tests, but made an unsatisfactorily sour-tasted tincture. On diluting 5 c.c. with 50 c.c. water and adding gradually to 5 c.c. of the solution N/10 sodium hydroxide, 29 c.c. were required to produce a permanent precipitate. Using a liquor which had been prepared in the official manner, and diluting in the same poportion, only 14 c.c. of the N/10 sodium hydroxide were required. It would be preferable to dilute 5 c.c. to 50 c.c. and titrate the

whole quantity with normal sodium hydroxide. A test for excess of acid seems to be desirable.

Liquor Santal. Flav. c. Cubeb. et Buchu. (*Pharm. Post*, **36,** 428.) Sandal wood oil, 60; cubeb oil, 30; copaiba oil, 22·5; pimento oil, 2·5; cassia oil, 2; tincture of buchu, 180; infusion of buchu (1 : 7), 180; alcohol 90 per cent., 240; solution of potash, 180; magnesium carbonate, 30; distilled water, 90. Heat the potash solution with the oils, and allow to stand in contact for 2 days. Then add the water, shake thoroughly, add the tincture and infusion of buchu, the spirit, and lastly the magnesium carbonate. Shake up thoroughly, allow to stand for 24 hours, then filter. Dose, 1–2 teaspoonfuls.

Magnesia Magma; Milk of Magnesia. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 399.) Dissolve magnesium sulphate, 250, in water, 4,000; dissolve sodium hydrate, 81, in water, 4,000; filter the solutions and pour the soda slowly in a thin stream with constant stirring, into the magnesium sulphate. Wash the precipitate by decantation until the washings are free from saline taste. Transfer the precipitate to a muslin strainer, and let it drain without pressing; then transfer to a suitable vessel and make up the volume to 1,000 with water. One teaspoonful of the shaken-up magma contains about 3 grs. of magnesium hydrate. The water used must be free from organic matter, or the precipitate will be coloured.

Morphine and Camphor, Hypodermic Injections of. (*Journ. Pharm. Chim.* [6], **19,** 341.) Camphor is frequently indicated in certain cases where a stimulant is necessary to accompany morphine in hypodermic injections. Since other morphine salts are not soluble in oil, it is proposed to employ the oleate, thus: Camphor, 1 Gm.; morphine alkaloid, 10 Cgm.; pure oleic acid, q.s. to dissolve; olive oil, washed in alcohol and sterilized q.s. to make 10 c.c. Each c.c. of this solution will therefore contain 10 Cgm. of camphor and 1 Cgm. of morphine.

Mercury, Liniment of. H. Finnemore. (*Pharm. Journ.* [4], **18,** 594.) The following formulæ are suggested as being an improvement on the official preparation:—

	(A)	(B)
Mercury ointment . . .	1 oz.	1 oz.
Solution of ammonia . .	5 fl. drs.	400 ♏.
Liniment of camphor . .	15 fl. drs.	800 ♏.

Mix the solution of ammonia with the liniment of camphor in a bottle, and with the product triturate the ointment of mercury. The product measures 3 fl. oz. These formulæ yield liniments which are of a nice creamy consistence, which thicken to some extent on keeping. B contains $\frac{1}{6}$ less than the quantity of ammonia in the official preparation.

Newer Remedies, Incompatibilities of Some. E. A. Ruddimann. (*Proc. Amer. Pharm. Assoc.*, **51,** 415.) *Agurin.* Readily soluble in H_2O; reaction alkaline; gives precipitates with $Pb2C_2H_3O_2$ at once, and on standing with $HgCl_2$, $MgSO_4$ and Fe_2Cl_6; also with free iodine. If agurin is in excess, a gelatinous thick liquid results, slowly depositing a precipitate; darkens HgCl; precipitates many alkaloidal salts; gives a mass when rubbed with chloral hydrate, phenol or piperazine. Certain of these reactions, due merely to alkalinity, may be avoided by first neutralizing the agurin solution.

Alumnol. Readily soluble in water; reaction acid. Precipitated by alkaline carbonates; with Fe_2Cl_6 gives a deep blue colour; precipitates albumin.

Ammonal. Partially soluble in water; alkaline in reaction. Filtrate from insoluble portion behaves like an alkaline carbonate. When rubbed dry with resorcin, thymol, phenol or chloral hydrate, gives a mass or liquid.

Diuretine. Readily soluble in water, reaction strongly alkaline. Precipitated by acids. Calomel is darkened by it. $HgCl_2$ throws down a white precipitate; a colour reaction with Fe_2Cl_6, but no precipitate. Ammonium carbonate, phosphates and borax slowly precipitate. Tincture of iodine is at first decolorized, then gives a precipitate. Precipitates alkaloids, makes a soft mass with chloral hydrate or phenol.

Europhen. Insoluble in water, soluble in alcohol, glycerin and fixed oils. Heat and light tend to liberate iodine. Should not be prescribed with metallic oxides, or metals with strong affinity for iodine.

Heroin. Sparingly soluble in water; reaction alkaline. Behaves as an alkaloid.

Heroin hydrochloride. Soluble in water. General behaviour that of an alkaloidal salt. Lessens the fluorescence of quinine solutions.

Ichthyol. Insoluble with water or glycerin. Precipitated by Fe_2Cl_6, $FeSO_4$, alum, $ZnSO_4$, $CaCl_2$, $MgSO_4$; not precipitated from dilute solutions by $HgCl_2$, KI or Na_2HPO_4. Liberates NH_3 with alkalies, precipitates alkaloids.

Phenocoll hydrochloride. Soluble in water. Precipitated slowly by alkalies and carbonates, sometimes in crystals, also by $HgCl_2$. Fe_2Cl_6 gives colour reaction and causes decomposition. Tincture of iodine gives a precipitate soluble in excess of phenocoll and the iodine is decolorized. Piperazine gives a precipitate.

Piperazine is hygroscopic, soluble in water, strongly alkaline in reaction. Precipitates with iron salts, $HgCl_2$, tannin, many alkaloids, and iodine. It forms a liquid when triturated with acetanilide, antipyrine, phenol, chloral hydrate and phenacetin.

Protargal. Soluble in water, slightly alkaline in reaction. Precipitates with $Pb2C_2H_3O_2$, $ZnSO_4$, $AgNO_3$, alum, Fe_2Cl_6, $HgCl_2$, dilute HCl, dilute acetic acid, and quinine sulphate.

Salophen. Nearly insoluble in water. Gives a colour reaction with Fe_2Cl_6. Decomposed by alkalies.

Nickel Bromide Pills and Syrup. Da Costa. (*Courrier Med.*, through *Bull. Comm.*, **32,** 178.) The author prescribes nickel bromide, which is obtained by saturating hot HBr with $NiCO_3$, filtering and evaporating to dryness on the water-bath, in the following forms:—

Pills. Nickel bromide, 60 Cgm.; powdered marsh mallow, 40 Cgm.; extract of gentian, 40 Cgm. Mass, and divide into 12 pills.

Syrup. Nickel bromide, 10; water, 120; glycerin, 15; sugar, 250 parts. Dissolve. The syrup has a fine green colour. It is given for epilepsy.

Nux Vomica, Liquid Extract of, Improved Process for. S. J. Lewis. (*Pharm. Journ.* [4], **17,** 516.) Nux vomica, in No. 20 powder, 20 lb.; alcohol 70 per cent., q.s.; alcohol 90 per cent., 6 pints; acetic acid, q.s.; distilled water, q.s.

Exhaust the drug by percolation with the alcohol 70 per cent. Transfer the percolate to a vacuum still and distil, reducing the pressure *secundum artem* more and more as the alcohol passes

over, so as to keep the temperature as low as possible, until the residual liquid measures about 5 pints, when approximately all the spirit will have been recovered; add 1 gallon of boiling distilled water, and render very faintly acid by addition of acetic acid. Set aside for 48 hours in a cold place, collect the separated fat, and boil it two or three or more times with a little water, to free it from alkaloid; mix these washings, and set them aside in a cold place to allow any fat to separate. Mix the aqueous liquids, and evaporate *in vacuo* to two pints; add the alcohol 90 per cent. to the warm liquor, and, when cold, make up to 1 gallon by addition of distilled water. Determine the strychnine content of the product, and dilute with alcohol 70 per cent. to the Pharmacopœial strength.

The alcoholic strength will be less than 70 per cent., but still rather stronger than the average product by the B.P. process. It is recommended to reduce the liquors *in vacuo*, so that the various constituents of the extract may be as little as possible affected by heat, thus preserving the characters of the official extract. However, the spirit may be recovered in an ordinary still at atmospheric pressure without great damage.

In conducting the assay of this liquid extract, as well as that obtained by Greenish and Smith's process, emulsification occurred quite as badly as with that made according to the official formula, indicating that the trouble is not primarily due to fat, but to some other constituent of the drug; and this view is confirmed by the fact that shaking out with chloroform or ether to remove fat does not eliminate, but only mitigates the trouble.

The following method of reducing to powder small quantities of nux vomica seeds has proved most successful: Hold a seed firmly in the jaws of a small vice (such as can be bought for half-a-crown), and file it down by means of a flat file 10 or 12 ins. long and $1\frac{1}{4}$ in. broad; the teeth of the file should be medium in size and sharp; a worn file adds much to the labour. The file should be large, in order to get sufficient power to work quickly. By this means a few ounces of nux vomica can be readily disintegrated.

Ointments and Varnishes, Skin-Coloured. H. Rausch (*Bull. Gén. de Thérapeut.*, **145**, 752) recommends the following tinted applications for various affections of the face: (1) Red bole, 1 gr.; glycerin, 12 drops; zinc ointment, 5 drachms. (2) Red

bole, 4 grs. ; glycerin, 20 drops ; solution of eosine (2 in 1,000), 8 drops ; zinc oxide paste, 1½ oz. (3) Ichthyol, 6–24 grs. ; zinc oxide paste, 1½ oz. ; eosine solution (2 in 1,000), 24-40 drops. (4) Red bole, 1 gr. ; eosine (2 in 1,000 solution), 54 grs. ; distilled water, 1 oz. 5 drachms, to 1 oz. 7 drachms ; gelatin, 185–230 grs. ; glycerin, 150-185 grs. ; zinc oxide, 300–400 grs. The above may be made more or less soft by lessening the quantity of water and glycerin, or by increasing the amount of zinc oxide and gelatin. (5) Red bole, 1 gr. ; solution of eosine, 6 drops ; zinc oxide, 20 grs. ; glycerin, 140 grs. ; gelatin, 1 oz. 7 drachms 30 grs. The last has proved an excellent remedy in dry facial seborrhœa.

Opium and its Preparations, Morphine Standard for. D. B. Dott. (*Pharm. Journ.* [4], **18**, 7.) With regard to the suggestion for raising the morphine standard for opium it is remarked that although doubtless an inferior or adulterated opium will yield so little as 10 per cent. of morphine, but, seeing that the powder must be standardized, it seems questionable whether there would be any advantage in changing from 10 to 12, while a change to 14 would certainly be opposed from the dosage point of view.

There is an inconsistency in the standard for extract of opium as compared with the other preparations. To bring the extract into line with the powders, etc., the percentage of morphine required should not be stated as 20, but as 19–21. The point is one of practical importance, as, in working with an opium rich in extract, 20 per cent. can only be obtained by making the extract excessively stiff. The author suggests 18·5-19·5 as a more suitable standard of anhydrous morphine.

With regard to the assay of opium and its preparations, the B.P. method is only applicable to opium in fine powder, and the time allowed is sufficient if the opium is very thoroughly and diligently mixed with the lime and water. Dowzard refers to the difficulty in obtaining 104 c.c. of filtrate. It might have been better arranged, but that can hardly be regarded as an essential part of the process ; a less quantity can be collected, as in his own method, and calculation made accordingly. Here it may be noted that 104 c.c. is undoubtedly an excessive proportion. The extractive from 10 Gm. of opium powder, after treatment with lime, does not measure in solution 4 c.c. It would be nearer the truth to say 2 c.c. Although the weighing of the

precipitated alkaloid may not be absolutely necessary, it is a useful precaution, since it ensures that no traces of ammonia are present, and the weight of the precipitate is a check on the final result. Indeed, the Japanese Pharmacopœia relies entirely on the weight. The statement has been made by Matthews (*Year-Book*, **1903,** 571) that a temperature somewhat above 100°C. is necessary to render morphine anhydrous, quoting 110°C. (B.P.) and 120°C. (Göhlich). It may be convenient to dry at 105–110°C., but morphine undoubtedly loses all its combined water at 100°C.

Pagliari's Hæmostatic Water. Ph. Ital. II. (*Journ. Pharm. d'Anvers*, **60**, 43.) Potash alum, 2; benzoin, 1; water, 20 parts. Boil together for 6 hours, keeping up the quantity of water lost by evaporation. Cool and filter. Pollacci modifies this by adding 2 per cent. of salt.

Paraldehyde Mixture. M. Meldrum. (*Pharm. Journ.* [4], **18,** 220.) The following mixture enables paraldehyde to be dispensed in a palatable form without a large separation: Paraldehydi: tinct. aurantii, aa ʒi.; spirit. limonis (1 in 10), ʒss.; saccharin, gr. viii. aquam, ad ʒviii. Sig. One oz. to be taken for a dose.

The whole of the paraldehyde is not soluble in this mixture, but the small excess is readily diffused by a slight shaking, and a "Shake the Bottle" label is sufficient.

Pastilles, Medicated. P. H. Marsden. (*Pharm. Journ.* [4], **18,** 803.) *Pastilli Ammonii Chloridi et Glycyrrhizæ.* Chloride of ammonium, 12 grs. dissolved in water, ½ dr., added to uncoloured glyco-gelatin (T.H.P.,) 126 grs.; liquid extract of licorice, 12 ♏; solution of ammonia, 2 or 3 drops. Divide into 6 pastilles.

Pastilli Codeinæ. Codeine, 3 grs.; rectified spirit, ½ dr.; water, 2 drs.; elixir of saccharin, B.P.C., ½ dr.; glyco-gelatin, T.H.P., 720 grs. To make 30 pastilles, each of which will contain a tenth of a grain of codeine. (Phosphate might be better used, and the rectified spirit omitted.)

Pastilli Mentholis. Menthol, 1½ gr., dissolved in rectified spirit, 12 ♏; add water, 48 ♏; elixir of saccharin, B.P.C., 24 ♏; glyco-gelatin, T.H.P., 288 grs. Divide into 12 pastilles.

Pilewort Ointment and Suppository for Hæmorrhoids. Sir James Sawyer. (*Brit. Med. Journ.* [1], **1904,** 14.) In 1901 the author directed attention to the value of an ointment

prepared from the fresh herb, *Ranunculus ficaria*, as an application for piles. This he directed to be prepared in the following manner: One part of the whole fresh plants collected in the spring, cut into small pieces, is digested in 3 parts of melted lard at 100°F. for 24 hours, then strained, and the herb pressed, the expressed liquid being added to the strained portion. In this manner a bright green ointment is obtained. Further experience has confirmed the value of the remedy; to render it more applicable to certain cases the use of suppositories is now recommended. These are obtained by melting together 4 parts of the above ointment and 1 part of spermaceti, moulding into a 90-gr. suppository.

Pill Excipients. (*Pharm. Centr.*, **44,** 38.) *For Alkaloids:* Starch, milk sugar, or kaolin massed with honey. *For Ammonium Carbonate:* Tragacanth (without glycerin). *For Methylene Blue or Pyoctanin:* Kaolin and vaseline. *For Chloral Hydrate:* Starch, tragacanth, massed with honey; or marsh mallow powder, massed with glycerin. *For Creolin:* Kaolin. *For Silver Nitrate, or Potassium Permanganate:* Kaolin and vaseline. *For Deliquescent Substances:* Canada balsam or kaolin and vaseline.

Pilula Ferri B.P. E. W. Lucas and H. B. Stevens. (*Pharm. Journ.* [4], **17,** 400.) Experiments show that pills massed with glucose, or with honey keep better than those prepared with the official excipient of glycerin and syrup. With honey, the mass assaying 20·26 per cent. of $FeCO_3$, when first made gave figures equivalent to 21·25 per cent. in 3 months; with glucose, the fresh mass gave 19·85 per cent., and 20·65 in 3 months; the B.P. mass assaying 20·05 when fresh only showed 16·44 per cent. in 3 months. Since the pills massed with glucose (the syrupy glucose of commerce, *not* the syrup of glucose of the B.P.) retain their form better than those in which honey is employed, its use is advocated in the following modification of the official formula: Glucose, 150 grs.; distilled water, 30 ♏; Exsiccated sulphate of iron in fine powder, 150 grs. Mix and quickly add exsiccated sodium carbonate in fine powder, 95 grs. Mix and set aside for 10 minutes, or until the reaction is complete. Add tragacanth, in powder, 15 grs.; gum acacia, in powder, 50 grs. Mix.

Pilula Ferri. F. H. Alcock. (*Pharm. Journ.* [4], **17,** 916.)

The following formula is suggested as giving a pill which retains its iron in the ferrous condition longer than the official preparation : Crystallized ferrous sulphate, 250 ; dried sodium carbonate, 100 ; sugar, 100 ; gum acacia, 50 ; tragacanth, 15 ; glycerin, 10 parts.

Podophyllum, Resin Standard for. T. Maben. (*Pharm. Journ.* **18,** 5.) The process for the determination of the resin may account for the varying results obtained in different laboratories. The series of figures from which the author has quoted gave a range of from 3 to 4·6 per cent. of resin, with an average of about 4·25. Dott has found from 3·5 to 5 per cent., and Umney recommends 5 per cent. as a standard—a figure that appears to be too high.

Pommade Guyon (a Catheter Lubricant). P. H. Marsden. (*Pharm. Journ.* [4], **18,** 804.) Powdered hard soap, glycerin, distilled water, of each, 33·00 ; phenol or beta-naphthol, 1·00. To be made without the use of heat.

Potassium Iodide and Mercuric Iodide Pills, Excipient for. M. Meldrum. (*Pharm. Journ.* [4], **18,** 219.) Having to dispense the following : Potass. iodid., gr. v. ; hydrarg. biniodid., gr. $\frac{1}{24}$; excipient, q.s., a mixture of powdered acacia and syrup was found to give the best results, the quantities for 12 pills being : Potass. iodid., 60 grs. ; hydrarg. biniodid., $\frac{1}{2}$ gr. ; syrup simplic., 4 ♏ ; pulv. acaciæ, 15 grs. Divide into 12 pills.

Protargol Paste. — Markowico. (*Merck's Report,* **17,** 157.) The following paste, which dries quickly, is prescribed as an application for large and deep ulcers : Protargol, 10–15 ; kieselguhr, 5 ; glycerin, 65 ; magnesium carbonate, 15 parts.

Quinine Tannate, Tasteless. (*Pharm. Post,* **36,** 583.) The following process is official in the *Supplement to the Dutch Pharmacopœia :* Quinine sulphate, 7, is dissolved in alcohol 95–96 per cent., 14, by warming on the water-bath. To the solution a similar alcoholic solution of anhydrous tannin, 24, is added, with stirring. The mixture is heated in a covered vessel until homogeneous, then poured into water, 200, with agitation, until the precipitate becomes pulverulent. It is then collected, pressed, and allowed to drain and dry at normal temperatures, being finally powdered and dried at a heat not exceeding 30°C. It should contain at least 9·5 per cent. of quinine.

Resinous Tinctures, the Dispensing of. H. Wilson. (*Pharm. Journ.* [4], **17**, 707.) With distilled water only in the proportion of 7 drs. to each dr. of tincture, the following tinctures yielded colloidal solutions or easily diffusible precipitates or a mixture of the two: Tincturæ cimicifugæ, hydrastis, lupuli, podophylli, benzoini simplicis, and myrrhæ. The two latter only remained as satisfactory mixtures for a few days when the above formula was employed, but with a smaller quantity of tincture they were much more permanent.

Separation of resin or other matter not readily diffusible was more or less rapid with the following: Tincturæ asafetidæ, benzoini compositæ, cannabis indicæ, cubebæ, guaiaci ammoniatæ, jalapæ, quininæ ammoniatæ, sumbul, tolutanæ, benzoini simplicis, and myrrhæ (the two last only when present in quantity).

With solutions of neutral salts in the proportion of 10 grs. to 1 fl. oz., all the above require the addition of a suspending agent, except tinctures of cimicifuga and of hops. All those tinctures which are incompatible with water precipitate even more with saline solutions.

As a suspending medium, acacia generally gives better results than tragacanth, but in some cases the use of both acacia and tragacanth mucilage in the proportion of 1 dr. to each oz. of the mixture gives better results than either alone. The method of admixture is to dilute the mucilage of acacia with as much water as possible, add the tincture, and, lastly, the mucilage of tragacanth. Results of experiments with resinous tinctures are given as follows:—

Asafetidæ. Acacia to be used, being more elegant than tragacanth, which in other respects is equally good.

Benz. Co. Acacia and tragacanth must both be used.

Benz. Simp. No addition necessary in absence of salts if quantity be small. Acacia good in all cases. Tragacanth good in absence of salts, but useless in their presence.

Cannab. Ind. Use acacia in absence, and tragacanth in presence of salts.

Cimicifugæ. No addition necessary in any case.

Cubebæ. and Guaiac. Ammon. Use acacia.

Hydrastis. No addition necessary in absence of salts. Use tragacanth in presence of salts.

Jalap. Use tragacanth.

Lupuli. Same as cimicifuga.

Myrrh. No addition necessary in absence of salts if quantity be small. If quantity be large, tragacanth should be used.

Podoph. No addition absolutely necessary in any case, but the addition of acacia makes a more elegant mixture in the presence of salts.

Quin. Ammon. Use acacia, but such mixtures become unpresentable after about 14 days.

Sumbul. Same as cubeba.

Tolut. Same as benz. co.

Ammoniated tincture of quinine is included as a "resinous" tincture, since it requires the same manipulation as these.

Rubber Plaster, Adhesive. C. S. N. Hallberg. (*Proc. Amer. Pharm. Assoc.*, **51,** 256.) Rubber, cut in small pieces, 20 Gm., is melted at a temperature not exceeding 150°C.; petrolatum, 20, is then added, and the heating continued until the rubber is dissolved; then add the lead plaster, or lead oleate (*see ante*, p. 288), 960; heat until it becomes liquid, then continue stirring as it cools until the mass stiffens. This basis gives a rubber plaster which may be incorporated with other medicaments, as prescribed, and is easy to spread and manipulate.

Saccharated Iron Oxide. (*Pharm. Post*, **36,** 583.) The following method of preparing *Ferrum Oxydatum Saccharatum* is official in the *Supplement to the Dutch Pharmacopœia*: Ferric chloride solution (containing 15 per cent. of Fe), 20, is mixed with simple syrup, 20, and water, 20; this is gradually added to a solution of sodium carbonate, 24, in water, 60, care being taken that the temperature of the mixture does not exceed 15°C. When the evolution of carbonic acid gas has ceased, sufficient caustic soda solution, about 14, is added to give a clear liquid; then sodium bicarbonate, 9, and boiling water, 600, are added. The precipitate thus obtained is collected on a cloth, washed free from chloride with boiling water, pressed, mixed with powdered sugar, 70, and dried on the water-bath.

Saponated Cresylic Acid. (*Report Nat. Form. Committee; Proc. Amer. Pharm. Assoc.*, **51,** 397.) Purified cresylic acid, 500; linseed oil, 350; caustic potash, 80; water, q.s. to produce 1,000 parts. Dissolve the potash in water, 50; add the linseed oil. Shake well together, then add the cresol and stir until the liquid becomes clear. Add enough water to make 1,000 parts by weight; strain if necessary. The purified cresol has the b.p. 188–198°C.

Saturated Solutions of Official Salts. H. G. Greenish.

(*Pharm. Journ.* [4]. **17**, 26.) The following useful data, obtained in the course of the series of determinations of the solubilities of official salts, are given in tabular form :—

	Specific Gravity of Saturated Solution.	Temp. (Fahr.)	C.c. of Water dissolve 1 Gm.	Gm. in 1 Litre Saturated Sol.	Ounces in 1 Pint Sat. Sol.	Grains in 1 Fl. Oz. Sat. Sol.
Acidum chromicum	1·710	61.5	0·59	1075·5	21·51	470·5
Acidum citricum	1·3026	61	0·51	861·7	17·23	377·4
Acidum tartaricum	1·31	58·5	0·71	766·1	15·32	335·2
Alumen (ammonium)	1·0459	59·5	9·95	95·5	1·91	41·8
Alumen (potassium)	1·046	59·5	9·70	97·7	1·95	42·8
Ammonii benzoas	1·0413	59	5·1	170·7	3·41	74·7
Ammonii bromidum	1·2904	59	1·40	537·7	11·75	235·2
Ammonii carbonas	1·094	59·5	3·94	221·5	4·43	96·9
Ammonii chloridum	1·077	60	2·8	472·4	9·45	123·9
Antimonium tartaratum	1·0400	60	17	57·4	1·148	25·0
Borax	1·0206	62	23·69	41·3	0·83	18·1
Calcii chlor. ($CaCl_2$)	1·4096	60	1·41	584·6	11·69	255·8
Calc. chlor. ($CaCl_2 2H_2O$)	1·4096	60	0·82	774·2	15·48	338·7
Chloral hydras	1·513	61·5				
Cupri sulphas	1·193	61	2·79	314·8	6·29	137·7
Ferri sulphas	1·2188	62	1·49	489·4	9·78	214·1
Hydrargyri perchlori.	1·0472	60	17·9	554·0	11·08	24·2
Magnesii sulphas	1·2755	60	0·98	643·9	12·88	281·7
Plumbi acetas	1·2554	60	2·37	372·5	7·45	163·0
Potassæ caustica	1·553	60	0·647	942·9	18·86	412·5
Potassii acetas	1·406	59	0·279	1099·2	21·98	480·9
Potassii bicarbonas	1·1688	60	3·21	277·7	5·55	121·5
Potassii bichromas	1·0660	60·5	9·93	97·5	1·95	42·7
Potassii bromidum	1·3615	60	1·59	525·7	10·51	230·0
Potassii chloras	1·0380	61	16·53	59·2	1·18	25·9
Potassii citras	1·520	60	0·55	980·6	19·61	429·0
Potassii iodidum	1·7039	59·5	0·701	996·4	19·92	435·9
Potassii nitras	1·1452	60	3·77	240·1	4·80	105·0
Potassii permanganas	1·0368	60	18·7	52·7	1·05	23·02
Potassii sulphas	1·0784	60·5	9·65	101·3	2·02	44·3
Potassii tartras	1·490	60	0·625	916·9	18·33	401·3
Soda tartarata	1·2713	59	1·138	594·6	11·89	260·1
Sodii arsenas	1·1765	60	4·88	200·0	4·00	87·5
Sodii benzoas	1·1643	59·5	1·64	441·0	8·82	192·9
Sodii bicarbonas	1·0608	63	11·08	87·8	1·76	38·4
Sodii bromidum	1·523	61·5	1·126	716·4	14·33	313·4
Sodii carbonas	1·1608	61	1·66	436·4	8·73	190·9
Sodii chloridum	1·204	61	2·8	316·8	6·34	138·6
Sodii hypophosphis	1·3880	61	0·63	851·5	17·03	372·5
Sodii iodidum	1·8937	59	0·577	1200·9	24·01	525·4
Sodii nitris	1·3474	60	1·36	570·9	11·42	249·8
Sodii phosphas	1·0489	59	6·91	132·6	2·65	58·0
Sodii salicylas	1·2484	59·5	0·83	682·2	13·64	298·5
Sodii sulphas	1·1114	59·5	2·68	302·7	6·05	132·5
Sodii sulphocarbolas	1·0697	59·5	5·48	164·7	3·29	72·0
Zinci acetas ($2H_2O$)	1·165	60	2·40	336·7	6·73	147·3
Zinci acetas ($3H_2O$)	1·165	60	2·11	374·6	7·49	163·9
Zinci sulphas	1·452	59·5	0·65	880·0	17·60	385·0

Soaps, Soft and Hard. J. Lothian. (*Pharm. Journ.* [4], **18,** 584.) Considering that the quality of soft and hard olive oil soap as met with in commerce is unsatisfactory, it is suggested to include in the B.P. formulæ for these two preparations. Those given are taken from the Swiss Pharmacopœia.

Sapo Mollis. Olive oil, 100 ; solid potassium hydroxide, 21 ; water, 100 ; alcohol 90 per cent., 20 parts.

Boil by means of a steam-bath until the oil is saponified, adding if necessary a little more spirit to assist the saponification. The resulting soap is approximately neutral.

Sapo Durus. Olive oil, 100 ; soda lye, sp. gr. 1·33, 50 ; alcohol 90 per cent., 30 parts.

Heat on a steam-bath until saponification is complete. The soap which is formed is dissolved in 300 parts of hot distilled water. The soap is salted out of this solution by adding a filtered solution of 25 parts sodium chloride, and 5 parts crystallized sodium carbonate in 80 parts of water.

An official solution of soft soap is much wanted. It has been pointed out before that such a solution would be useful for preparing *Linimentum Terebinthinæ* more expeditious than by the present method. It could also be readily medicated, and used as a liquid soap for medicinal purposes.

Oleates of a more uniform nature can be prepared by using a genuine olive oil soap instead of the castile soap of commerce.

Sodium Arsenate Solution. F. H. Alcock. (*Pharm. Journ.* [4], **17,** 915.) In view of the varying percentage of water in the crystalline salt and the extremely hygroscopic nature of the dried arsenate at present official, it is suggested that the equivalent of sodium pyroarsenate should be used, which for the present B.P. formula would be 16·6 grs. for 4 fl. oz.

Soft Soap. G. M. Beringer. (*Amer. Drugg.*, **44,** 200.) It is found that linseed oil alone, as directed in the official process of the U.S.P., does not readily saponify with the prescribed amount of alkali and alcohol. A better soft soap is obtained by the use of the following formula : Linseed oil, 40 Gm. ; Malaga olive oil, 40 Gm. ; caustic potash, 19 Gm. ; alcohol, 10 c.c. ; water, 60 c.c.

Warm the mixed oils on the water-bath to 70°C. ; dissolve the potash in the water and warm this also to 70°C. ; add this to the oil and stir thoroughly. Now add the alcohol, and, as soon as this is thoroughly incorporated, stop stirring. Continue the heat at this temperature for a short time until saponification

is complete, which is evidenced by the mass becoming clear and a portion dissolving in boiling water or alcohol without the separation of oil globules. The finished product will weigh about 140 Gm.

If the above directions are followed, the resulting soap is an almost transparent, smooth, greenish-yellow mass, but if stirring is continued after the addition of the alcohol until saponification is completely effected, then the resulting soap is opaque from included air.

Solubility of Chemical Substances Mentioned in the B.P., 1898. H. G. Greenish and F. A. Upsher Smith. (*Pharm. Journ.*, **17**, 881, 945.) The solubilities of a few inorganic salts and a number of organic compounds are now given, in continuation of work previously published (*Year-Book*, **1902**, 252.)

The results are summarized in tabular form on page 304.

Squill, Oxymel of. E. W. Lucas. (*Pharm. Journ.* [4], **17**, 778.) Samples of oxymel of squill obtained from different makers vary considerably. Some are pale and slightly opalescent, while others are clear and of a pale sherry colour. In addition, no two specimens agree in viscosity.

A batch of eight times the B.P. quantity, made by the author, gave a filtrate having a density of 1·07 and measuring 76 fl. oz. The specific gravity of the clarified honey was 1·410, so that, mixed in the proportion of 9 to 25, 211 oz. were required to produce a gravity of 1·32 in the finished product. The press used was only a small hand one, so that the proportion of expressed and filtered liquid mentioned in the Pharmacopœia is slightly too high. Working on much larger quantities, and using a powerful hydraulic press, the proportion is increased. New Chilian honey was used, the product being of a pale straw colour, which poured readily from a narrow-necked bottle.

From this it would appear that if oxymel were always prepared with pale honey, and the gravity carefully adjusted, the samples met with in trade should vary but little; but, as the Pharmacopœia permits the use of honey from any country, of all shades from pale yellow to brownish-yellow, and as considerable heat is employed during manufacture, it is easy to see how colour differences arise. Moreover, owing to the meagre official description and lack of tests, honey that has been sophisticated with glucose is not infrequently met with.

Substance.	Solvent.	Solubility Found.	B.P.	U.S.P.	P. Germ.
Antimonium tartaratum	Water	1 in 17·1	1 in 17	1 in 17	1 in 7
Argenti nitras	Water	1 in 0·53	1 in less than 1	1 in 0·6	1 in 0·6
Ferri sulphas	Water	1 in 1·5	1 in less than 2	1 in 1·8	1 in 1·8
Hydrargyri perchloridum	Water	1 in 17·9	1 in 16	1 in 16	1 in 16
Hydrargyri perchloridum	90 per cent. alcohol.	1 in 3·64	1 in 3	1 in 3	1 in 3
Hydrargyri perchloridum	Ether (B.P.)	1 in 4·35	1 in 4	1 in 4	1 in 12 to 14
Acetanilidum	Water	1 in 210	1 in 200	1 in 194	1 in 230
Acetanilidum	90 per cent. alcohol.	1 in 4·2	1 in 4	1 in 5	1 in 3·5
Acidum benzoicum	Water	1 in 420	1 in 400	1 in about 500	1 in 370
Acidum benzoicum	90 per cent. alcohol.	1 in 2·75	1 in 3	1 in 2	
Acidum carbolicum	Water	1 in 14		1 in about 15	1 in 15
Acidum carbolicum	Glycerin	1 in 0·33	freely	very	
Acidum carbolicum	Olive oil	1 in 2	freely	very	
Acidum gallicum	Water	1 in 105	1 in 100	1 in 100	
Acidum salicylicum	Water	1 in 500	1 in 500	1 in about 450	1 in 500
Acidum salicylicum	90 per cent. alcohol.	1 in 3·5	1 in 3	1 in 2·4	
Butyl chloral hydras	Water	1 in 37	1 in 50		
Camphora	90 per cent. alcohol.	1 in 1·25	1 in 1		
Camphora	Chloroform	1 in 0·35	1 in 0·25	readily	
Camphora	Olive oil	1 in 3	1 in 4		
Chloral hydras	Water	1 in 0·25	1 in less than 1	freely	freely
Chloral hydras	90 per cent. alcohol.	1 in 0·2	1 in less than 1		
Glusidum	Water	1 in 360	1 in 400		
Glusidum	90 per cent. alcohol.	1 in 37·5	1 in 25		
Iodoformum	90 per cent. alcohol.	1 in 95	1 in 80		
Menthol	90 per cent. alcohol.	1 in 0·2	readily		
Naphthol	90 per cent. alcohol.	1 in 1·8	in 1 less than 2		
Phenacetinum	90 per cent. alcohol.	1 in 25	1 in 20		1 in 16
Phenazonum	Water	1 in 1·2	1 in 1		
Phenazonum	90 per cent. alcohol.	1 in 1·3	1 in 1·3		
Saccharum lactis	Water	1 in 6	1 in 7	1 in 6	1 in 7
Salicinum	Water	1 in 28·4	1 in 28	1 in 8	
Salicinum	90 per cent. alcohol.	1 in 80	1 in 60		
Salol	90 per cent. alcohol.	1 in 15	1 in 10		
Santoninum	90 per cent. alcohol.	1 in 52	1 in 40		1 in 44
Sulphonal	Water	1 in 450	1 in 450		1 in 500
Sulphonal	90 per cent. alcohol.	1 in 80	1 in 50		1 in 65
Thymol	90 per cent. alcohol.	1 in 0·325	freely		

Practically, all genuine honey imported into this country is lævo-rotatory, the direct polarimetric readings ranging from −2° to −15° on the sugar scale, and it is only rarely that honey of coniferous origin, or that produced by bees fed on cane-sugar, comes into the market. At any rate, genuine honey with a + reading is not often seen.

Even if slightly dextro-rotatory honey should be used in the manufacture of oxymel of squill, the product could not have a + reading, as squills contain a lævo-rotatory sugar which more than neutralizes the rotation of any sucrose that may be present. Experiments made on various batches of the strong vinegar of squills show an average deviation of about −28° on the sugar scale.

It may naturally be expected, therefore, that all oxymel of squill in commerce would behave in the same manner, no matter whence the origin of the honey; any samples having a + reading should be considered suspicious, and glucose or cane-sugar looked for.

The presence of the latter would be at once indicated by the indirect reading. For the detection of glucose two fairly good qualitative tests are available. One dependent upon the fact that the dextrinoid bodies of glucose are more insoluble in strong alcohol than the carbo-hydrates of genuine honey, the other upon the colour reaction of glucose when treated with dilute iodine solution. These tests may be conveniently performed as follows:—

One volume of honey or oxymel is mixed with 4 volumes of water, and filtered through animal charcoal, the filtrate being returned until it passes through nearly colourless. It is divided into two portions. To one is added 5 volumes of absolute alcohol. Genuine honey gives only a slight opalescence, while an opaque precipitate forms at once if glucose be present, even as little as 20 per cent. To the second portion of filtrate is added one drop of volumetric iodine solution. Pure honey is unaffected: if glucose be present the iodine is at once bleached, as the former rarely contains less than 0·05 per cent., and frequently as much as 0·1 per cent. of sulphurous acid. If more iodine be added, drop by drop, the slightest excess gives rise to a reddish-brown colour, due to the amylo- and erythro-dextrins present. Honey containing glucose is strongly dextro-rotatory.

Eleven commercial samples of oxymel of squill were examined. The annexed table gives the results:—

Density at 15·5°C.	Gm. of Real Acetic Acid in 100 C.c.	Alcohol Test.	Iodine Test.	Cupric Reducing Power.	Direct Reading.	After Inversion.
(1) 1·310	1·92	Nil.	Nil.	49·1	−15.5	−20·4
(2) 1·323	1·87	Nil.	Nil.	53·2	−16·3	−21·6
(3) 1·336	1·08	Nil.	Nil.	56·1	−15·7	−19·1
(4) 1·326	2·46	Nil.	Nil.	53·0	−11·0	−14·8
(5) 1·318	1·06	Nil.	Nil.	49·2	−15·1	−16·7
(6) 1·322	0·36	Nil.	Nil.	55·4	−14·0	−15·7
(7) 1·327	0·53	Nil.	Nil.	52·3	−12·1	−16·9
(8) 1·303	1·20	Nil.	Nil.	53·2	−13·9	−15·7
(9) 1·325	1·05	Heavy ppt.	Deep Red Brown.	45·6	+27·4	+23·9
(10) 1·350	0·26	Nil.	Nil.	57·5	−12·1	−17·4
(11) 1·321	1·81	Heavy ppt.	Deep Red Brown.	46·2	+26·4	+23·6

These, calculated to cane sugar, invert sugar and glucose, are as follow :—

No.	Percentage reckoned as Sucrose.	Percentage reckoned as Invert Sugar.	Percentage as Glucose.
1 . .	3·6	48·5	Nil.
2 . .	3·9	53·4	—
3 . .	2·5	55·6	—
4 . .	2·8	51·8	—
5 . .	1·18	48·9	—
6 . .	1·25	54·3	—
7 . .	3·5	51·5	—
8 . .	1·3	52·3	—
9 . .	2·57	36·1	19·1
10 . .	3·9	56·4	—
11 . .	2·06	36·8	18·8

Some of the samples being very dark, they were all treated as follows : 65·12 Gm. of oxymel of squill (two and a half times the normal sugar weight) were introduced into a 250 c.c. flask, lead oxyacetate, alumina cream, and slight excess of sodium sulphate added, made up to bulk and filtered through animal charcoal, but *not* made up again afterwards. For titration of the acid the samples were simply diluted with water and decolorized with animal charcoal. All readings were taken on the sugar scale at 16°C.

Strychnine, Solubility in Presence of Alkalies and Iodides in Mixtures. G. Rice. (*Chem. and Drugg.*, **65**, 34.) The solubility of strychnine in distilled water at 60°F. is not more than

1 in 6,000, but it was found that a mixture containing 20 grs. of ammonium carbonate and 20 ♏ of solution of strychnine hydrochloride, with distilled water to 1 oz., remained clear on standing, although the proportion of strychnine is 1 in 2,200. This mixture has been kept for several months, and remains free from crystallization. But this does not apply to the same strength of strychnine mixture with all other alkalies.

With Ammonium Carbonate. (*a*) Ammon. carbonat., gr. xx.; liq. strychninæ, ♏xx.; aq. destillat. ad ℥j. (*b*) Ammon. carbonat., gr. xx.: liq. strychninæ, ♏50; aq. destillat. ad j. *A* remains clear. *B* gradually deposits fine crystals of strychnine which partly adhere to the bottle.

With Solution of Ammonia. Liq. ammoniæ, ♏xx.; liq. strychninæ, ♏xx.; aq. destillat. ad ℥j. Rather dense crystals of strychnine separate, a few adhering to the walls of the bottle.

With Aromatic Spirit of Ammonia. Spt. ammon. arom., ♏xl.; liq. strychninæ, ♏xx.: aq. destillat. ad ℥j. Flocculent crystals of strychnine are thrown out.

With Bicarbonates. (*c*) Potassii bicarbonat., gr. xx.; liq. strychninæ, ♏xx.: aq. destillat. ad ℥j. (*d*) Potassii bicarbonat., gr. xx.; liq. strychninæ, ♏50; aq. destillat. ad ℥j. *C* remains perfectly free from deposit of strychnine, and it is not until the alkaloid is increased to the proportion of 1 in 880 (as in *D*) that a fine crystallization of strychnine results which adheres to the bottle.

Sodium bicarbonate was used in place of potassium bicarbonate, and in the same proportions as in *C* and *D*, with substantially the same results, the 20-gr. one being free from crystallization, and the 50-gr. one yielded granular, transparent, and comparatively large crystals of the alkaloid.

With Potash. Twenty grains of potassium carbonate with 20 ♏ of strychnine solution and distilled water to 1 oz. yielded a crystalline deposit of the alkaloid. The crystals were in tufts. Using liquor potassæ ♏xx. in place of the carbonate, the crystallization is finer and apparently more abundant.

Nux Vomica and Alkalies. Tincture of nux vomica was also experimented with, and in the case of each of the following there is a distinct crystalline separation of alkaloids: (*e*) Tr. nucis vom., ℥j.; spt. ammon. arom., ℥j.; aq. dest. ad ℥j. (*f*) Tr. nucis vom., ℥j.; liq. ammon., ♏xx.; aq. dest. ad ℥j.

With Potassium Iodide. Liq. strychninæ, ♏xx.: potassii iodidi, gr. xx.; aq. dest. ad ℥ij. This gave a deposit of strychnine.

Although in general dispensing practice deposits of strychnine in mixtures containing a bicarbonate are not usually observed, one must recognize the fact that if the quantity of the liquor exceeds 10 ♏ in a tablespoonful we begin to approach the dangerous limit in temperate climates. The fact should not be overlooked that solution of potassium bicarbonate slowly gives off carbonic-acid gas, especially when the temperature exceeds 80° F., therefore the bicarbonate is partly resolved into carbonate, which precipitates the alkaloid with certainty.

Other cases of strychnine-precipitation take place, such as with iodides and bromides, and are well known. The above examples are satisfactory because they decide to a certain extent how far it is possible to answer questions whether solution of strychnine and its preparations can be dispensed with the bicarbonates and sal volatile. There is in all cases a danger-point; but it can be said with certainty that the strength of the mixtures would have to be such as rarely occurs in prescriptions.

Sulphur Iodide, Method of Manipulation. F. H. Alcock. (*Pharm. Journ.* [4], **17,** 460.) Since sulphur iodide is readily soluble in CS_2, it is suggested that this should be employed as a solvent to remove the compound from the flask, instead of breaking the vessel in the crude manner now directed in the official directions. In this way the inclusion of particles of glass, of which there is necessarily a danger when the flask is broken, is avoided. Six drachms of the solvent is sufficient to remove the product of combining 60 grs. of sulphur and 15 grs. of iodine, the containing vessel being lightly corked and gently warmed on a hot iron tray. The liquid, with the small amount of granular insoluble matter, is then easily removed to an open dish and the solvent blown off. The residue, after standing over night, no longer smells of the CS_2, and the crystalline residue is non-adherent to the dish.

Suppository Moulds, Improved. L. C. Hopp. (*Proc. Amer. Pharm. Assoc.*, **51,** 435.) The author finds that the difficulty often experienced in moulding suppositories is due to the moulds used not being heavy enough in metal, and therefore not cooling with sufficient rapidity; or, as it is tersely expressed in the note, "which contains metal enough to hold the required amount of cold to bring about a quick contraction when the mass is poured into the mould." By using a large, heavy mould the mass at

once contracts from the mould to the centre. If the two heavy moulds be first chilled, then filled and stood on ice, one can be emptied as soon as the other is filled. An ordinary (1 doz. ?) mould was exhibited, which weighed 7 lb. With a mould of this weight no clamps are necessary to keep the halves in position.

Syrup of Magnesium Sulphate, Palatable. Littlc (*Therap. Gaz.* [3], **19,** 319) prescribes magnesium sulphate dissolved in syrup of raspberry, thus: Magnesium sulphate, ʒss.; syrup of raspberry, 2 fl. oz. Dissolve. Dose, a tablespoonful or more.

Tamarind Essence. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, **49,** 505.) Mix tamarind pulp, 500, with boiling water, 2,500, and allow to macerate for 10 hours. Then strain through a fine sieve, without pressure, and evaporate the strained liquor on the water-bath to 1,000. Neutralize 750 parts of this with magnesium carbonate. Meanwhile, macerate crushed senna leaves, 50, magnesia, 2, in water, 500, for 24 hours. Strain without pressure, mix with the tamarind liquor; add the whites of two fresh eggs to the mixture, heat to boiling; when clarified, filter through flannel, and evaporate the filtrate on the water-bath to 780 Gm. Then cool and add the following, previously mixed: Syrup of orange peel, 50; alcohol 90 per cent., 50; simple syrup, 50; syrup of cinnamon, 50; orange-flower water, 12·5; tincture of ginger, 2·5; tincture of vanilla, 5·0 parts. One or two glassfuls to be taken in the morning, fasting.

Tamarind Laxative Conserve. (*Bull. Sci. Pharm.*, through *Nat. Drugg.*, **33,** 320.) Tamarind pulp, 5; plum preserve, 3; sugar, 2; senna leaves, powdered, 1; potassium bitartrate, 1 part.

Mix thoroughly, and evaporate the moisture on the water-bath until of a consistence that will permit (by the aid of starch powder) of making into firm lozenges of about 4 scruples in weight. Dry the lozenges for 24 hours at about 40°C. (104°F.). At the end of this time have ready a molten mass of 100 parts chocolate and 20 parts of cacao oil, and into this mass dip each lozenge and withdraw, repeating the operation until the covering is of the desired thickness.

Tannalbin, Preparation of. (*Pharm. Centr.*, **44,** 413.) Egg albumin, 20, is dissolved in water, 200, and the solution

filtered. The filtrate is treated with tannin, 13, collected on a cloth, washed with water, 200, pressed, dried at 30°C., and rubbed to powder. The powder is then again dried at 115–120°C. for 6 hours. Tannalbin is thus tested: 1 Gm. is digested for 3 hours at 40°C., with pepsin, 0·25 Gm., 1 c.c. of hydrochloric acid, and water, 100 c.c. The undigested residue is collected, dried, and weighed. Another similar quantity is treated in the same manner, but the residue is then digested for another 3 hours with a 1·5 per cent. solution of sodium carbonate. The insoluble portion is also collected, dried at 100°C., and weighed. The difference between the two weights should not be less than 0·2 Gm. Tannalbin should not give more than 1 per cent. of ash.

Tar Water, Concentrated (Ph. Batav. Supp.). (*Pharm. Centr.*, **44,** 454.) Sodium carbonate, 1, is dissolved in hot water, 50; wood tar, 10, is added to the solution, frequently shaken for a day, and filtered. The filtrate should be kept in completely filled bottles.

Thyme, Compound Fluid Extract of. (*Pharm. Spezial. vom Luxemburg. Apothekerverein*, through *Pharm. Zeit.*, **49,** 505.) Powdered herb of *Thymus vulgaris*, powdered herb of *Thymus serpyllum*, equal parts; alcohol 68–69 per cent., q.s. Prepare a valoid fluid extract in the usual manner.

Thymus Gland Extract. P. L. Marsden. (*Pharm. Journ.* [4], **18,** 803.) Thymus gland, sliced, 1 Gm., triturated with glycerin, 1 c.c.; solution of phenol (0·5 per cent.), 1 c.c.

Allow to stand for 24 hours and press through fine linen. The finished product contains 1 part of thymus gland in 2 fl. parts.

Tinctures, Official, Notes on Suggested Standards for. T. Maben. (*Pharm. Journ.* [4], **18,** 5.) *Tinct. Conii.* Conium fruit contains from 0·36 to 0·91 per cent. of conine, based on acid titration. Some observers record much higher figures. A standard of 0·5 per cent. for the fruit would imply 0·1 per cent. for the tincture, which is slightly higher than the 0·09 per cent. proposed by Barclay.

Tinct. Digitalis. Chemical or physical standards are of little value in this preparation, but it may be cited that the extractive, in a 1 in 1 fluid extract, varies from 21 to 35 per cent., the mean being 28. If, therefore, a tincture standard based on extractive

were desired, a figure of 3·5 Gm. per 100 c.c. would be quite reasonable.

Tinct. Hamamelidis. Witch-hazel bark fluid extract (1 in 1) yields an extractive varying from 21 to 33 per cent., with an average of about 25. The standard of 2 per cent. for the tincture, recommended by various writers, seems on the safe side.

Tinct. Krameriæ. Peruvian rhatany (*Krameria triandra*) fluid extract (1 in 1) yields from 24 to 43 per cent. extractive, and 25 may be regarded as a safe minimum, so that the tincture should not contain less than 5 per cent. of extractive, as recommended by Barclay and Umney.

Tinct. Lupuli. The extractive from hops is exceedingly variable, the range of that of the fluid extract (1 in 1) being from 9 to 22 per cent., with an average of about 15. The standard suggested by Chattaway, 4 per cent. extractive, therefore seems high.

Tinct. Myrrhæ. The extractive from fluid extract of myrrh (1 in 1, 94 per cent. alcohol) varies from 15 to 31·6 per cent., the average being under 25. The standard adopted for tincture should not be more than 5 per cent. of extractive.

Tinct. Quillaiæ. Using a somewhat weaker spirit than is specified in the B.P., a fluid extract (1 in 1) of soap bark yields extractive varying from 29·5 to 45·3 per cent., the average being over 35 per cent. It would appear, therefore, that by reducing the strength of the spirit a tincture could be had containing nearly 50 per cent. more extractive than is suggested by various writers.

Tinct. Senegæ. The extractive from the fluid extract of the root (1 in 1) varies from 23 to 30 per cent., the average being about 26. The extractive from the tincture ought not to exceed 5 Gm. in 100 c.c. Suggestions have been made for 4·5, 4·6, and 6.

Tinct. Stramonii. The alkaloid in stramonium leaves varies from 0·27 to 0·4, and a safe standard is 0·3. This would give a tincture containing 0·06 per cent. of alkaloid, which is 50 per cent. stronger than the figure recommended by Barclay.

Tinct. Zingiberis. Ginger yields from 2·7 to 6 per cent. of extractive in a fluid extract (1 in 1), the average being under 5 per cent. Barclay's suggestion of 0·4 per cent. extractive as a standard for the tincture is to be preferred to Umney's 0·5.

Tragacanth, Mucilage of, Substitute for. H. Finnemore.

(*Pharm. Journ.* [4], **18,** 595.) A suspension of 1 part of powdered tragacanth in 4 parts of alcohol 95 per cent. is suggested as a substitute for the aqueous mucilage, which does not keep. Four to 8 ♏ added to each ounce of mixture is sufficient to suspend the insoluble substances prescribed.

Turpentine Embrocation. (*Pharm. Spezial. vom Luxemburg Apothekerverein.*, through *Pharm. Zeit.*, **49,** 505.) *For Human Use.* Fresh white of egg, 25; pyroligneous acid, 50; oil of turpentine, 50. Mix to an emulsion.

For Veterinary Use. Fresh white of egg, 25; pyroligneous acid, 50; oil of turpentine, 75. Mix to an emulsion.

Turpentine Liniment. W. Knight. (*Chem. and Drugg.*, **63,** 992.) Prepared according to the official directions, this liniment requires long and tiring trituration to attain the official requirement of a thick creamy emulsion, and hence the preparation is dispensed of varying degrees of thickness, according to the patience and persistency of the operator and the strength of his wrist. The following method requires little manipulation, and the product is always of an uniform consistence.

For the official quantity, heat 1½ oz. of soft soap with 5 oz. water in an enamelled-iron dish over a Bunsen flame until a complete solution is effected; remove from the source of heat and add 4 oz. oil of turpentine; stir with a pestle for a couple of seconds and pour the resulting "primary emulsion" into a bottle; and 1 oz. of camphor dissolved in 9 oz. of oil of turpentine, shake once or twice, and make up to a pint with water.

No violent shaking or trituration is required, and the product is a thick cream. It may be mixed with another pint of turpentine, and is even then inseparable. It might be objected that the process involves some loss of oil by volatilization, but the loss is not greater than is caused by the prolonged trituration in the usual method. This slight loss may, however, be avoided by pouring the soap-solution into the oil contained in a wide-mouthed bottle.

NOTES AND FORMULÆ.

PART IV.

NOTES AND FORMULÆ.

Almond Cream. (*Spatula*, **10,** 92.) Spermaceti, 2 troy oz.; white wax, 2 troy oz.; castor oil, 4 troy oz.; cotton seed oil, 10 fl. oz.; borax powder, 1 dr.; bitter almond water, 7 fl. oz.; essential oil of almonds, 5 drops; oil of bergamot, 20 drops; oil of rose geranium, 10 drops. Dissolve the borax in the bitter almond water. Melt the spermaceti and wax in the oils; add the borax solution; stir constantly until cold, adding the perfumes last.

Almond Meal. (*L'Union Pharm.*, **45,** 200.) Powdered sweet almonds, 100 Gm.; powdered bitter almonds, 20 Gm.; rice powder, 120 Gm.; borax, 5 Gm.; powdered orris root, 5 Gm.; oil of bergamot, 0·03 Gm.; oil of lemon, 0·10 Gm.

Antihæmorrhoidal Drops. (*Nouv. Remèdes.*) Tincture of hydrastis, 4; tincture of viburnum, 4; tincture of hamamelis, 10; tincture of horse chestnuts, 10 parts. Ten to 20 drops to be taken before meals in a little sweetened water.

Aromatic Cachous. (*Drugg. Circ.*, **46,** 234.) Peppermint oil, 30 ♏; lemon oil, 20 ♏; neroli oil, 20 ♏; cinnamon oil, 20 ♏; cloves in powder, 40 grs.; vanilla, 120 grs.; orris root, 120 grs.; powdered sugar, 6 drs.; extract of licorice, 10 drs.; mucilage of acacia, q.s. Mix, mass, roll flat and cut into suitable shapes. Dry at a low temperature.

Bacillus typhosus and B. coli communis, Drigalski and Conradi's Medium for Differentiation of. D. Sommerville. (*Brit. Med. Journ.* [1], **1904,** 191.) Take 10 Gm. Liebig's extract of meat (Lemco) and dissolve in 1 litre of water; heat to boiling. Add 10 Gm. Witte's peptone; 10 Gm. neutrose, 3 Gm. NaCl, 2·75 Gm. agar. Steam in Koch's sterilizer for 2 hours; neutralize with pure Na_2CO_3; put in autoclave 30 minutes at 115°C. Filter. (Filtration requires on an average 45 minutes.) Add

to filtrate 100 c.c. neutral litmus (Kubel and Tiemann's) which has been recently boiled and mixed with 15 Gm. lactose; neutralize with Na_2CO_3. Add 2 c.c. 10 per cent. Na_2CO_3, 10 c.c. 1: 1,000 crystal violet; sterilize in Koch's sterilizer (15 minutes). Pour into large Petri dishes to depth of 2 mm.

The entire process is completed in 3–4 hours, and the volume turned out is just about a litre.

Bay Rum. (*Seifensieder Zeit.*, **31,** 131.) Alcohol 96 per cent., 550; tincture of quillaia, 550; distilled water, 500; powdered borax, 8; ammonium carbonate, 8; bay rum essence, 12·5–15 parts. Mix. The *Bay Rum Essence* for above is compounded of: Oil of *Myrcia acris*, 32; sweet orange oil, 2; pimento oil, 2; essential oil of bay, 1; essence of Jamaica rum, 24 parts.

Birch-bud Toilet Water. (*Pharm. Zeit.*, **48,** 331.) Alcohol 96 per cent., 350; water, 70; soft soap, 20; glycerin, 15; essential oil of birch-buds, 5; essence of spring flowers, 10 parts; chlorophyll, q.s. to tint. Mix the water with an equal volume of spirit, and dissolve the soap in the mixture. Mix the oil and other ingredients with the remainder of the spirit, add the soap solution gradually, agitate well allow to stand for 8 days and filter. For use, dilute with an equal volume of water.

Blood, Hydriodic Acid as a Microchemical Reagent for. C. Stryzsowski. (*Annales de Pharm.*, **9,** 314.) The following reagent is employed to detect the presence of blood in stains, by means of the formation of characteristic crystals of iodohæmatin. Glacial acetic acid, water, alcohol, of each, 1 c.c., are mixed with 3–5 drops of pure syrupy hydriodic acid, sp. gr. 1·5. The object to be examined is placed between a glass slip and cover glass, in the usual manner, and a few drops of the reagent are applied to the edge of the cover, so that the liquid flows underneath. The slide is then gently warmed, if necessary twice, for 10 seconds over a small flame, care being taken to replace the reagent evaporated. On cooling, very evident and characteristic crystals of iodohæmatin are obtained, if blood be present, even if it be much diluted.

Blood and Bloodstains, Human, Differentiation from Animal. H. Marx and E. Ehrnrooth. (*Muench. Med. Woch.*, **51,** 293.) The following simple method is stated to satis-

factorily distinguish human from other vertebrate bloodstains, and to be effective even after the lapse of 12 months or more, so that it is not necessary that the bloodstain should be recent in order to pronounce a definite opinion of its origin. The stain is scraped and mixed with a few drops of a 0·6 per cent. solution of NaCl, and a drop or two of the brownish or reddish-brown solution transferred to a microscope slide. A drop of blood is then obtained by pricking the thumb with a needle and mixed with the solution on the object glass with a glass stirrer for 5 or 6 seconds. The mixture is then covered with a cover glass. For 15 minutes it is examined under the microscope. If the bloodstain be that of an animal, the corpuscles will be seen rapidly to aggregate ; if it be human they will remain evenly distributed over the microscope field. The fresher the bloodstain the more rapid will be the aggregation. Reactions have been obtained with horse, dog and calf bloodstains on linen, 3 years old ; with human blood on linen, wood and paper, from 2 weeks to 2 years old, and with rabbit, pig, cattle and sheep blood from 2 weeks to 1 year old. Monkey blood alone somewhat resembles human blood in its behaviour, but it may be readily distinguished by the form assumed by the human blood corpuscles in contact with blood solution under the conditions of the test. With monkey blood solution they assume a polygonal outline, with human blood a crenulated or prickly aspect.

Bouquets, New, Synthetic. (*Seifensieder Zeit.*, **30,** 952.) *Violette royal.* Irisolette, 120 ; synthetic jasmin oil, 10 ; solution of synthetic rose oil (1 per cent.), 150 ; solution of coumarin (2·5 per cent.), 50 ; solution of vanillin (25 per cent.), 50 ; simple tincture of benzoin, 100 ; moschinol, 5 ; synthetic ylang ylang oil, 10 ; alcohol (90 per cent.), 9,000 parts.

Rose of Shirah. Synthetic rose oil, 200 ; moschinol, 5 ; tincture of Tolu balsam, 100 ; synthetic neroli oil, 5 ; solution of ambrette oil (1 per cent.), 125 ; vanillin, 2 ; alcohol (90 per cent.), 9,000 parts.

Persian lilac. Moschinol, 5 ; Ambrette oil, 1 ; synthetic oil of jasmin, 20 ; simple tincture of benzoin, 200 ; vanillin, 10 ; synthetic ylang ylang oil, 10 ; muguet, 150 ; aubepine, 3 ; terpineol, 80 ; alcohol (90 per cent.), 9,000 parts.

White Heliotrope. Concrete heliotrope, 250 ; vanillin, 40 ; moschinol, 10 ; synthetic ylang ylang oil, 25 ; simple tincture of benzoin, 200 ; synthetic rose oil, 60 ; synthetic cassie oil, 20 ; oil of ambrette, 5 ; alcohol (90 per cent.), 9,000 parts.

Kadsura. Synthetic jasmin oil, 20; simple tincture of benzoin, 100; moschinol, 5; bergamot oil, 150; citral, 5; synthetic neroli oil, 10; coumarin, 15; heliotropin, 30; alcohol (90 per cent.), 9,000 parts.

Bridal Bouquet. (*Spatula*, **9,** 410.) Sandal oil, 30 m; rose extract, 4 fl. oz.; jasmin extract, 4 fl. oz.; orange flower extract, 16 fl. oz.; essence of vanilla, 1 fl. oz.; essence of musk, 2 fl. oz.; tincture of storax, 2 fl. oz. (The tincture of storax is prepared with liquid storax and alcohol (90 per cent.), 1 : 20, by macerating for 7 days.)

Brilliantines. (*Seifensieder Zeit.*, **31,** 96.) *Separating Brilliantines.* (1) Oil of sweet almonds, 500; castor oil, 200; alcohol (96 per cent.), 300; essence of Jockey Club, 20; essence of reseda, 10; essential oil of almonds, 1 part.

(2) Oil of sweet almonds, 500; olive oil, 150; alcohol (96 per cent.), 300; glycerin, 50 parts; perfume as desired.

Clear Brilliantines. (1) Castor oil, 350; alcohol (96 per cent.), 150; bergamot oil, 7·5; sweet orange oil, 7·5 parts.

(2) The basis is composed of the following: Alcohol (96 per cent.), 300; glycerin, 28; castor oil, 200 parts. Mix the alcohol and the glycerin, then add the castor oil. This may be perfumed with 2·5 or 3 per cent. of a mixture of equal volumes of bergamot and sweet orange oil, or with one of the following perfumes:—

Lily of the Valley. Oil of ylang ylang, 2; lingaloe oil, 4; cananga oil, 3; bergamot oil, 10 parts.

Heliotrope. Heliotropin, 10; coumarin, 2·5; bitter almond oil, 2·5 parts.

Reseda. Reseda geraniol, 0·25; ionone, 1·5 parts.

Violet. Ionone, 1·5 Gm.; reseda geraniol, 2 drops.

[These perfumes would also be suitable for high-grade hair oils.—Ed. *Year-Book.*]

Calcium Sulphide to Destroy Dodder. F. Garrigou. (*Comptes rend.*, **138,** 1549.) Dusting with calcium sulphide is a certain cure for lucerne and other fodder plants affected with a parasitic growth of *Cuscuta* which often occasions great damage to such crops. The dodder begins to turn black a few hours after dusting with the sulphide, and is completely destroyed in 48 hours, especially if the weather be damp when the dusting is performed. If the season is dry, the calcium

sulphide should be moistened before being applied. The author claims that the application is also efficacious against aphides and other insect pests. [The application of the remedy would need to be made with extreme caution to most plants, since the caustic effect is very marked, even when the sulphide is applied in dilute solution.—Ed. *Year-Book.*]

Carbon Tetrachloride, Uses of. O. Raubenheimer. (*Proc. Amer. Pharm. Assoc.*, **51,** 319.) The more extended use of CCl_4 is advocated, as it is now obtainable at a low price chemically pure. Its value as a solvent is considerable, and it has the great advantage of being non-inflammable. It is applicable to the following technical uses:—

As a solvent for fixed and essential oils, fats, waxes, paraffin, spermaceti, vaseline, pitch, resins and balsams.

For extracting fixed from various animal and vegetable products.

As a cleaning fluid for type, lithograph stones, printers' rollers, machinery, metals and jewels. As a grease remover from clothes and fabrics in place of less efficient and highly inflammable solvents.

For fireproofing paints, varnishes and other similar articles.

As a fire extinguisher, being stored in thin, easily broken bottles.

As an alkaloidal solvent for the extraction of drugs, etc. It is claimed to be preferable to other volatile solvents, moreover, since it leaves no residual odour in the extracted material.

Carbon Tetrachloride and Benzin Cleansing Fluid. O. Raubenheimer. (*Proc. Amer. Pharm. Assoc.*, **51,** 426.) Carbon tetrachloride, 10 fl. oz.; benzin, 10 fl. oz. Mix. This mixture is an excellent cleansing liquid and may be used without danger in close proximity to fire; in fact, at normal temperatures it will not ignite, and will even extinguish a lighted match.

Castor Oil Seeds, Hydrolyzing Action of. E. Urbain and L. Saugon. (*Comptes rend.*, **138,** 1291.) Not only do castor oil seeds split up the glycerides of the fatty acids, but they also convert starch into sugar, and invert saccharose; this also is the property of cytoplasma which hydrolyzes oil, starch and sugar. The active agent of this hydrolysis is, therefore, the cytoplasma contained in the seeds.

Cement for Metals. (*Spatula*, **10,** 92.) Litharge, 2; boiled

linseed oil, 2; white lead, 1; copal, 1 part. Heat together until of an uniform consistence, and apply warm.

Chilblains, Treatment of. (*Pract. Notes. Bull. Gén. de Thérap.*, **146,** 880.) Liebreich recommends the following treatment for chilblains: once a week paint with fresh, non-acid tincture of iodine. Apply the following dressing: Alum, borax, of each, 1; rose water, 60; tincture of benzoin, 3 parts. If the itching be troublesome apply the following ointment nightly: Camphorated oil, 1; lanoline, 10 parts, after first applying the following lotion: Cocaine hydrochloride, 1, glycerin, 20; cherry laurel water, 20 parts.

Cosmetic Cream. J. T. Pepper. (*Amer. Drugg.*, **42,** 157.) Quince seeds, 45; boric acid, 30; glycerin, 600–750: alcohol 90 per cent., 250; distilled water, 3,000; tincture of benzoin, simple (1 : 10), 15 fl. parts; menthol, 0·15; extract of white rose, 10; bergamot oil, 1 part. Carefully crush the quince seeds in a mortar, so as not to powder the dark-coloured seed-coats, and macerate in the water for 48 hours, having previously added the boric acid. Shake frequently and thoroughly during this period. Then strain, add the glycerin, and finally the other ingredients, all previously mixed with the alcohol. Any desired perfume may be substituted for the white rose. It is well to keep the water warm during a part of the maceration process, since the resulting mucilage will then have a thicker consistence. The cream is suitable for use either in summer or winter.

Crême de Beauté. (*L'Union Pharm.*, **45,** 200.) Sweet almonds, blanched, 15; orange flower water, 60; rose water, 60; borax, 1; simple tincture of benzoin, 2 parts. Emulsify the almonds in the rose and orange flower water in which the borax has been previously dissolved. Add the tincture of benzoin and strain. Add 1 or 2 teaspoonfuls to the water for washing.

Decomposition of Light by Liquids. — Mansie. (*Répertoire* [3], **15,** 340.) A mixture of glycerin, sp. gr. 1·242, and oil of turpentine decomposes the rays of white light in an interesting manner. If about 15 c.c. of this glycerin and 3 or 4 c.c. of turpentine be shaken together in a test-tube, and allowed to separate, the greater part of the turpentine rises to the surface, but numerous minute oily particles remain diffused through the liquid for some time. If the window-frames, or writing, or print, be now observed through the liquid, these objects

will appear blue instead of black, while the outline is surrounded by a yellow border. If the tube be now immersed in a water-bath, so that the liquids become clear, and the same objects be again viewed through the liquid, they will appear green. Gradually, as the liquid cools, they become yellow, orange, red, violet, indigo, and lastly blue. Accompanying each change of colour, a border of the complementary colour will be seen outlining each object. The same change of colour as is produced by heat may be obtained by adding water, drop by drop, to the mixture of turpentine and glycerin.

Domestic Healing Ointment. "Mutter Salbe." (*Amer. Drugg.*, **42,** 188.) Olive oil, 4; thus, 2; yellow wax, 1; lard, 1; red lead, 1; honey, 4; camphor, 2 parts. Melt the thus, beeswax and lard in the oil. Then heat the mixture gradually to near its boiling point, gradually adding the red lead and stirring constantly until it assumes a dark brown colour. Then remove from the fire, and when it becomes somewhat cool, add the honey, and, lastly, the camphor.

Eau de Quinine Hair Wash. (*Seifensieder Zeit.*, **31,** 131.) Compound tincture of cinchona, 100; quinine sulphate, 1; alcohol 96 per cent., 500; rose water, 500; glycerin, 60; ess. bouquet, 50; tincture of rhubarb, 20; sodium bicarbonate, 12 parts.

Ess. Bouquet. (*Spatula*, **9,** 411.) (1) Otto of rose, 4 ♏; oil of neroli, 2 ♏; essence of musk, 40 ♏; extract of jasmin, 5½ fl. oz.; tincture of orris, 8 fl. oz.; alcohol 90 per cent., to make 80 fl. oz. (2) Oil of neroli, 15 ♏; oil of lemon, 1 dr.; oil of bergamot, 30 ♏; extract of cassie, 1 fl. oz.; essence of ambergris, 1 fl. oz.; tincture of orris, 1 fl. oz.; spirit of rose, 8 fl. oz.; alcohol 90 per cent., 5 fl. oz. (3) Oil of bergamot, 2 drs.; oil of lemon, 1 dr.; tincture of ambergris, 1 fl. oz.; tincture of orris, 2 fl. oz.; spirit of rose, 5 fl. oz. Mix and filter with French chalk. (4) Lavender oil (Mitcham), 30 ♏; oil of neroli, 8 ♏; otto of rose, 30 ♏; oil of bergamot, 24 ♏; essence of musk, 2½ drs.; essence of ambergris, 5 drs.; alcohol 90 per cent., 8 fl. oz. Mix. The spirit of rose in the above is prepared thus: Otto of rose, 2 drs.; oil of rose-geranium, 1 dr.; alcohol 90 per cent., 20 fl. oz.

Eucalyptus Formalin. (*Bull. Comm.*, **31,** 374.) Formalin, 1; tincture of eucalyptus, 1; alcohol 80 per cent., 8 parts. Mix.

This forms an active antiseptic, suitable both for disinfecting the sick chamber and for direct application in endometric catarrh, blennorrhagia and vaginitis. For injections use 2 tablespoonfuls to 35 fl. oz. of water ; as a disinfectant, 1 tablespoonful to a like quantity of water, which should be evaporated in the room.

Fat, "Fettponceau K," as a Selective Stain for. (*Annales de Pharm.*, **9**, 315.) L. Michaelis states that amido-azo-toluol-azo-β-naphthol, or "Fettponceau K," is a serviceable stain for differentiating fatty matter in histological preparations. The object is dried, fixed with formalin, and macerated for 15 to 30 minutes in a saturated solution of Fettponceau K in alcohol 70 per cent. It is then washed quickly with alcohol 70 per cent., plunged in water, and finally mounted in glycerin or lævulose syrup. Nuclei may be stained with methylene blue.

Fumigating Paper. (*Spatula*, **9**, 677.) Select good white blotting-paper, and cut each demy sheet lengthwise into three equal pieces. Make a solution of 1 oz. of potassium nitrate in 12 oz. of boiling water ; place this solution in a large plate, and draw each strip of paper over the solution so as to saturate it. Then dry by hanging up. The dried paper is to be saturated in a similar manner with either of the following solutions : Siam benzoin, 1 oz. ; storax, 3 drs. ; olibanum, 40 grs. ; mastich, 40 grs.; cascarilla, 2 drs. ; vanilla, 1 dr. ; alcohol 90 per cent., 8 oz. Bruise the solids and macerate in the spirit 5 days, filter, and add : Oil of cinnamon, 8 ♏ ; oil of cloves, 8 ♏ ; oil of bergamot, 5 ♏ ; oil of neroli, 5 ♏. Mix.

Fumigating Pastilles. (*Spatula*, **9**.) Powdered willow charcoal, 8 oz. ; benzoic acid, 6 oz. ; potassium nitrate, 6 drs. ; thyme oil, caraway oil, sandal oil, clove oil, lavender oil, otto of rose, of each, 30 ♏ ; tragacanth powder, 20 grs. ; rose water, 10 fl. oz. or q.s. to mass. Mix the solid ingredients and add the oils ; make a mucilage with the tragacanth and a portion of the rose water. Mass, and divide into suitable cones. Dry at a gentle heat.

Fumigating Ribbon. (*Spatula*, **9**, 677.) Take ½ in. cotton tape and saturate it with nitre in the same manner as the paper above described ; when dry saturate with the following tincture : Benzoin, 1 oz. ; orris root, 1 oz. ; myrrh, 2 drs. ; tolu balsam,

2 drs.; musk, 10 grs.; alcohol 90 per cent., 10 fl. oz. Macerate for a week, filter, and add 10 ♏ of otto of rose.

Another good formula, which may also be used for fumigating-paper, is: Olibanum, 2 oz.; storax, 1 oz.; benzoin, 6 drs.; Peruvian balsam, ½ oz.; tolu balsam, 3 drs.; alcohol 90 per cent., 10 fl. oz. Macerate 10 days, and filter.

Germ-Free Clinical Thermometers. — Stini. (*Bull. Gén. de Thérap.*, **145,** 12.) The fact that the modern clinical thermometer may be a source of infection has several times been pointed out, since micro-organisms may easily become lodged in the inequalities of the surface formed by the etched graduations of the stem. Stini has devised a simple pocket case in which the clinical thermometer is carried always immersed in a sterilizing solution. It consists simply of a metal tube closed at one end with a tight-fitting cap, which screws on by a fine thread, and is fitted with a fluid-tight washer. The thermometer is enclosed in another slightly smaller close-fitting metal case, similar to that at present used, but freely perforated laterally with holes, so as to allow free access of the antiseptic to the instrument, in which it is by this means kept immersed. This smaller tube is carried in the larger one, partially filled with the liquid antiseptic. Any germicidal antiseptic may be used. The author employs a 1 per cent. solution of phenosalyl.

Glove Cleaning Powder. (*L'Union Pharm.*, **45,** 69.) Powdered pipeclay, 60; powdered orris root, 30; powdered soap, 7½; powdered borax, 15; powdered ammonium chloride, 2½ parts. Mix. Wet the gloves with a damp cloth, rub the powder well over the surface, allow to dry thoroughly, then brush off.

Glycerin Cream. (*Spatula*, **10,** 91.) Spermaceti, 6 troy oz.; white wax, 2 troy oz.; castor oil, 5 fl. oz.; cotton seed oil, 11 fl. oz.; borax powder, 1 dr.; glycerin, 6 fl. oz. Dissolve the borax in the glycerin. Melt the spermaceti and wax in the oils; incorporate the glycerin and borax.

Hair, Loss of, Pomade for. (*Journ. Pharm. Chim.* [6], **19,** 232.) Pilocarpine hydrochloride, 2; quinine hydrochloride, 4; precipitated sulphur, 10; balsam of Peru, 20; beef marrow, q.s. to make 100 parts. Wash the head thoroughly with soap and water, then apply the pomade.

Hair Wash and Stimulant. (*Seifensieder Zeit.*, **31,** 131.) Tincture

of cinchona, 400; tincture of arnica, 500; tincture of cantharides, 25; bitter almond oil, 0·25; castor oil, 25; balsam of Peru, 10; Hoffmann balsam, 40 parts. [The Hoffmann's balsam in the above is the *Mistura oleobalsamica*, Ph. G., thus composed: Oils of lavender, thyme, lemon, nutmeg and neroli, of each, 4; eugenol and cassia oil, 3½; Peruvian balsam, 10½; alcohol 94 per cent., q.s. to make 1,000 parts. Mix, let stand, and filter. —Ed. *Year-Book.*)

Handle Cement. (*Spatula*, **9,** 281.) Resin, 12; sulphur flowers, 3; iron filings, 5 parts. Melt together, fill the handle while hot, and insert the instrument.

Harness Preparations. (*Bull. of Pharm.*, **16,** 481.) *Oil.* Turpentine oil, 8 oz.; beeswax, 4 oz.; Prussian blue, ½ oz.; lamp-black, ¼ oz.; neat's-foot oil, q.s. Melt the wax, add the turpentine, incorporate the Prussian blue and the lamp-black, both in the finest powder, then add enough neat's-foot oil to bring to the desired consistence. *Polish.* Mutton suet, 2; beeswax, 6; sugar, 6; soft soap, 2; lamp-black, 1; oil of turpentine, 4; water, 4 parts. Melt the suet, beeswax and soap together, add the turpentine, stir in the lamp-black, dissolve the sugar in the water with heat, and pour the syrup into the hot mixture of other ingredients; stir until cold. *Blacking.* Soft soap, 3 oz.; isinglass, ¾ oz.; Prussian blue, ¼ oz.; transparent glue, 2 oz.; logwood, 2 oz.; vinegar, 24 oz.; lamp-black, q.s. Simmer all the ingredients together over a slow fire and strain.

Heliotrope Perfume. (*Spatula*, **10,** 92.) Heliotropin, 60; coumarin, 3; Peru balsam, 5; vanillin, 2; terpineol, 5; alcohol, deodorized, 10,000; water, distilled, 6,300 parts. Dissolve the other ingredients in the alcohol and add the water.

Herring Roe, Hard and Soft, Constituents of. L. Hugounenq. (*Journ. Pharm. Chim.* [6], **19,** 521.) A new albumin, clupeovin, has been isolated from hard salted herring roes which contain, besides 6·5 per cent. of lecithins, 10·33 per cent. of fat and 2·27 per cent. of keratin. The new albumin is lævorotatory, $[\alpha]_D$ — 57·4°; when decomposed with 30 per cent. H_2SO_4, by boiling for 16 hours, it yields: Arginine, 2·7; lysine, 2·0; histidine, 0·4; tyrosine, 1·0; leucine, 21·2; amido-acids, 50·7; and humic products, 22 per cent. It differs entirely from the albumin of the soft roe of the herring, and from that

of fowls' eggs. Soft roes contain a protamine, clupeine, which is readily split up into arginine, of which it yields 82 per cent. The hard roes, therefore, are rich in acid bodies, and relatively poor in basic substances, while the soft roe is mainly composed of bodies yielding a powerful base.

Honeysuckle Bouquet. (*Spatula*, **9,** 479.) Neroli oil, 12 ♏ ; otto of rose, 10 ♏ ; essential oil of almonds, 8 ♏ ; essence of musk, 1 oz. ; tincture of storax, 4 fl. oz. ; essence of vanilla, 6 fl. oz. ; cassie extract, 16 fl. oz. ; tuberose extract, 16 fl. oz. ; violet extract, 16 fl. oz. ; rose extract, 16 fl. oz.

Hungarian Pommade in Tubes. (*Pharm. Centr.*, **45,** 34, after *Nuerste Erfind. und Erfahr.*) (1) Water, 10 ; glycerin, 2 ; powdered gum acacia, 3 ; white beeswax or Carnauba wax, 5 ; olive oil, 6 parts. Melt together on the water-bath to form a homogenous mass. Then add caustic potash solution, sp. gr. 1·384, with constant stirring and water, 3, continuing stirring until saponification is complete ; perfume with cassia oil, 0·3, and bergamot oil, 0·5. (2) White beeswax or Carnauba wax, 100 ; soft soap, 50 ; powdered gum arabic, 50 ; rose water, 100 ; bergamot oil, 6 ; and rose geranium oil, 1 part. Heat the soap with the gum on the water-bath, add the wax, then the rose water, stir until an uniform mass is formed. Lastly add the perfumes.

Hyancinth Bouquet. (*Spatula*, **9,** 480.) Hyacinthin, 1 dr. ; neroli oil, 10 ♏ ; essence of musk, 50 ♏ ; tincture of benzoin, 100 ♏ ; extract of jasmin, 10 drs. ; orange-flower water, 5 drs. ; alcohol 90 per cent., 10 fl. oz.

Ink Eraser Powder. (*Nat. Drugg.*, **33,** 7, after *Pharm. Zeit.*) An excellent erasive powder for ink may be prepared from a mixture of equal parts of powdered alum, sulphur, amber, and potassium nitrate. A small quantity is sprinkled on the ink blot or writing which it is desired to erase, and rubbed with a piece of clean blotting paper or rag. The mark is thus completely removed.

Ink Stains, Rapid Method of Removing. Graham Bott. (*Pharm. Journ.* [4]. **17,** 102.) The material requiring treatment should first be soaked in clean warm water, the superfluous moisture removed, and the fabric spread over a clean cloth. Now allow a few minims of *Liquor ammoniæ fortis*, sp. gr. 0·891,

to drop on to the ink spot, then saturate a small tuft of absorbent cotton wool with *Acidum phosphoricum dilutum, B.P.*, and apply repeatedly and with firm pressure over the stain ; repeat the procedure 2 or 3 times, and finally rinse well in warm water, afterwards drying in the sun, when every trace of ink will have vanished. By other methods some considerable difficulty is often experienced in removing parts of the stain even when it is of recent origin, but the above method is equally reliable both for old and fresh ink stains, is rapid in action, perfect in results, and, moreover, will not injure the most delicate fabric.

Insect Bites, Carbolic Vaseline for. O. Rosenbach. (*Therap. Monats.*, through *Pharm. Centr.*, **45,** 465.) Carbolic acid, 1 ; vaseline, 49 parts, in the form of an ointment, is a most effective remedy for allaying the itching of insect bites, due to the anæsthetic action of the phenol.

Kid Glove Cleaner. (*Spatula*, **10,** 92.) Soft soap, 1 oz. ; water, 4 oz. ; oil of lemon, ½ dr. ; precipitated chalk, q.s. Dissolve the soap in the water, add the oil, and make into a stiff paste with a sufficient quantity of chalk.

Lanoline Hair Cream. A. Spintler (*Pharm. Zeit.*, **48,** 456) recommends the following basis for preparing a lanoline hair cream : Quillaia bark, 4, is macerated for several days in water, 36, strained and filtered, and alcohol, 4, added to the filtrate. The liquid is then warmed to above the melting point of lanoline, and shaken with 12 parts of anhydrous wool-fat. Finally, sufficient dilute alcohol 15 per cent. is added to make the whole up to 300. To this basis any active ingredient, such as quinine, tincture of cantharides, or any desired perfume, may be added.

Leather Polish, Liquid. (*Spatula*, **10,** 35.) Sandarach, 2 drs. ; shellac, 1 troy oz. ; glycerin, 1½ drs. ; castor oil, 2 drs. ; oil of mirbane, ½ dr. ; aniline blue, 10 grs. ; aniline black, 1 dr. ; alcohol (methylated), 8 oz. Dissolve.

Lichens on Cascarilla Bark. E. Senft. (*Oesterr. Zeit. für Pharm.*, **41,** 891, through *Pharm. Journ.* [4], **17,** 453.) It is now a well-established and generally accepted fact that the chalky appearance of cascarilla bark is due to the presence of myriads of crystals of calcium oxalate embedded in the walls of the cork cells, and not to any superficial coating of lichens. Especially is this the case with the small cascarilla bark at present in commerce,

Such bark bears but very few lichens, and such as are present are by no means well developed. Older specimens of the bark, such, for instance, as those of the materia medica collection of the Vienna University, exhibit more numerous and better developed lichens, no fewer than 45 having been recorded and described. Senft now adds four that are new for cascarilla, and one altogether new species which he has named *Arthonia voglii*. The lichens present on barks may, under certain circumstances, possess diagnostic value, and it is interesting therefore to note the following, which, according to Senft, are the most characteristic for cascarilla: *Trypethelium eluteriæ*, Spreng., *Arthopyrenia planorbis*, Müller Arg.; *Anthracothecium cascarillæ*, Müller Arg.; *Arthonia polymorpha*, Ach.; *Phalogrophina pachnodes*, Müller Arg.

Liquid Glue. (*Nat. Drugg.*, **33,** 320, after *Rundschau.*) Sugar, 4; water, 12; slaked lime, 1 part. Dissolve the sugar in the water, add the lime, and agitate occasionally for half an hour. Allow to subside, and decant the bright liquid. To every 12 or 15 parts of this solution add 3 parts of glue, and allow to swell. Then dissolve by gentle heating. The product thus obtained will remain permanently liquid, and possesses excellent adhesive properties. Obviously, the consistence of the liquid may be modified by using more or less of the saccharated lime solution.

Lotio Crinalis (Kaposi). P. H. Marsden. (*Pharm. Journ.* [4], **18,** 803.) Acid. salicylic, 3·00; spt. vini gallic, 300·00; spt. coloniensis, 25·00; glycerin, 10·00 parts. To be applied every other day.

Mona Bouquet. (*Spatula*, **9,** 482.) Benzoic acid, 6 grs.; neroli oil, 20 ♏; clove oil, 1½ dr.; otto of roses, 2 drs.; bergamot oil, 2 drs.; sandal oil, ½ fl. oz.; essence of musk, 3 fl. oz.; tincture of orris, 4 fl. oz.; rose water, 5 fl. oz.; alcohol 90 per cent. to make up to 2 pints.

N-Rays, Summarized Record of Recently Published Notes on. In view of the important rôle which N-ray observation promises to play in the near future, in medicinal diagnosis, in the following summary the physiological bearing of the question is considered apart from the purely physical experiments with these rays. As far as possible the chronological order of the various notes has been preserved, but where greater lucidity is attained by

the juxtaposition of communications published at different dates, this has been done.

Discovery and Physical Properties of N-Rays.

In 1903 R. Blondlot observed (*Comptes rend.*, **136,** 1142) that the sun, besides ordinary heat and light rays, also emits rays which traverse metals, wood, and other opaque substances. These rays, which he named "N-rays," may be detected by the property they possess of increasing the phosphorescence of feebly phosphorescent bodies; in this respect they resemble Becquerel's rays. The presence of these rays in sunlight is easily demonstrated. A tube containing a feebly phosphorescent substance, such as calcium sulphide, is exposed in a perfectly dark room before a window closed by oakwood shutters, 15 mm. thick. It will be seen that the intensity of the phosphorescence increases opposite the window; if the hand or a sheet of lead be interposed between the tube and the window, the light emitted diminishes, to be reproduced on withdrawing the intercepting obstacle. The introduction of several sheets of aluminium between the shutter and the tube does not affect the phosphorescence; nor do cardboard nor a piece of oakwood 3 cm. thick. A thin stratum of water, however, arrests the rays at once. Clouds passing over the sun also considerably diminish their action. These N-rays may be concentrated by a quartz lens. They are reflected by polished, diffused by unpolished glass. They are without action on the photographic plate. These experiments are easily reproduced; to obtain good results the phosphorescent substance should not be too active, and the tube containing it should be placed on a black paper.

These rays were also found by him some time previously in the emanations of a focus tube (*Comptes rend.*, **136,** 1227). They may be reflected, are refracted, and are separable into a spectrum, and may be collected by a condensing lens. They are not in themselves phosphorescent, but they provoke, or appear to increase, the phosphorescence of feebly phosphorescent surfaces. They increase the visibility of a minute electric spark or of a small flame. In this way their influence may be photographed. The increase of phosphorescence is not instantaneous, being due in part to a storage of the rays by the phosphorescent body, for he found (*Comptes rend.*, **137,** 729) that certain bodies have the property of storing

N-rays. He soon observed, when experimenting with the N-rays emitted by an Auer burner, passed through a sheet of aluminium forming one of the sides of the lantern, and concentrated by means of a quartz lens, that, after the burner had been extinguished, the phosphorescence of the screen remained almost as bright as before. When a sheet of moistened paper, or of lead, or the hand, was interposed between the screen and the lantern, the former became dull. The only difference observed after the extinguishing of the burner was that the phosphorescence gradually died out, taking about 20 minutes to disappear. On investigating the cause it was found that the quartz lens had itself become a source of N-rays. On withdrawing it, after extinguishing the lamp, the phosphorescent screen became dull, but resumed its light again when the lens was brought near it. A similar storage of N-rays was observed with a sheet of quartz after exposure to the rays of an Auer burner, screened with two sheets of aluminium and of black paper. Fluor spar, Iceland spar, barytine and glass behave like quartz. The filament of a Nernst lamp gives off N-rays for several hours after the lamp has been extinguished. Gold, lead, platinum, silver, and other metals act in a similar manner, but the radiant energy takes some time to penetrate into the mass of the metal. Thus, if a sheet of lead 2 mm. thick be exposed for a few minutes to a source of N-rays, it is only the surface next to the source which excites the phosphorescent screen. It requires several hours' exposure for the N-rays to penetrate to the other side. Aluminium, wood, paper, and paraffin do not store up N-rays. Calcium sulphide does so, however, explaining the observed phenomenon that the phosphorescence of the screen takes some time to develop and to disappear. Flint stones, limestone, and brick exposed to the sun were found to have stored up N-rays, and remained active for four days with scarcely any perceptible diminution of their energy. The surface of these substances must be perfectly dry, since the thinnest layer of moisture prevents the emission of the rays. Garden soil was found to be inactive, so were flint stones taken from a few inches below the surface of the ground, even when they were dried.

A. Charpentier (*Comptes rend.*, **138,** 414) discovered that N-rays are capable of transmission by means of metallic wires, and also by other bodies hitherto regarded as insulating materials, such as glass and wood, by a kind of conductivity ; but copper

or silver wire appear to be the best conductors. If two phosphorescent screens are brought into contact with the terminals of such a wire, and one of them be excited, an increase in the luminosity of the other screen is at once evident. On cutting the wire, the light of the receiving screen gradually becomes paler; on re-uniting the cut ends it again increases. Radioactivity has thus been conducted through a wire 10·5 metres in length, which was in two pieces simply joined by torsion. The time necessary for the phosphorescence on the receiving screen to become evident varies with the length of the wire. It was noted that the steady phosphorescence of the receiving screen was established by oscillations of intensity lasting for several seconds, the same oscillations occurring in the screen acting as the source. When N-rays were conducted along a thread wire coated with phosphorescent calcium sulphide, it became luminescent throughout its entire length, and appeared to be traversed by waves of varying intensity. The wire thus coated forms a good means of demonstrating the emission of N-rays by the living body. This property of conductivity of N-rays has enabled the author to utilize those derived from solar energy, by exposing to sunlight screens of zinc sulphide and calcium sulphide, covered by a sheet of metal and conducting the N-rays thus obtained by means of wires.

P. Jégou (*Comptes rend.*, **138,** 491) then confirmed the fact announced by Gutton that N-rays are given off by all wires along which an electric current is passing. The action of the rays on the blue portion of a gas flame may be readily observed by means of a piece of unpolished glass held near the flame. It is also found that the liquid in the cell of a Leclanché battery is an energetic source of N-rays. If the circuit be closed in a Léclanché element for a time, this saline liquid accumulates N-rays, which are doubtless conducted along the wire.

N_1-Rays. R. Blondlot soon announced the discovery of a new kind of N-ray, which he termed N_1-rays (*Comptes rend.*, **138,** 545). Certain facts obtained by Guilloz led him to suspect the existence of two kinds of N-rays. Investigation has confirmed this, and by examining the rays of a Nernst lamp, extremely dispersed by passage through aluminium prisms first of 60°, then of 90°, he isolated a form of ray which he calls N_1-rays, which have the property of lessening the phosphorescence of the calcium sulphide screen instead of increasing it, and which have a slightly greater wave length. Certain sources seem to emit N_1-rays exclusively;

or, at least, they predominate; such are stretched copper, silver, and platinum wires. N_1-rays may be stored like N-rays. Thus, if a piece of quartz be brought near a stretched copper wire, it emits N_1-rays for some time.

Sources of N_1-rays. J. Meyer finds (*Comptes rend.*, **138,** 896) that threads of glass or copper, when stretched, also closed tubes of glass partially exhausted, are sources of N_1-rays. A phosphorescent screen of calcium sulphide placed under the bell jar of an air pump loses its phosphorescence when a vacuum is produced due to the action of N_1-rays by the diminished pressure. It regains its luminosity when normal atmospheric pressure is restored. If the phosphorescent screen be placed outside the bell jar, its luminosity decreases with the first strokes of the pump. Glass bulbs of incandescent lamps, through which no current is running, Geissler's tubes, Crookes' tubes at rest, are all sources of N_1-rays. While the N_1-rays of a Nernst lamp are arrested by lead or a sheet of moistened paper, those derived from the above sources have a markedly greater penetrating power, those from an electric light bulb not being sensibly intercepted by the interposition of a piece of wood 10 cm. thick, or a sheet of oxidized lead 1 mm. thick folded up eight times. Cardboard, paraffin, most metals, and the human hand are all transparent to these rays. The only substance found to be opaque to them are platinum 1 mm. thick, and opal glass 3 mm. thick. Most substances which are transparent to these rays, and also saline solutions, store them and emit them for a long time after they have been exposed to their action.

Blondlot observed (*Comptes rend.*, **138,** 547) that the relative position of either the observer or the emitting object, with reference to the screen, has a great influence on the visibility of the phosphorescence. When the action of N-rays on the phosphorescent screen is observed normally, the light of this is seen to be increased. If, however, the observation be made obliquely, almost tangentially, the luminosity, on the contrary, will appear diminished, and by taking an intermediate position, no sensible difference in the amount of light emitted will be evident. It is for this reason that only the observer placed directly in front of the screen can perceive the effects, and explains the difficulty of demonstrating the action of the rays to an audience of individuals in different positions. N_1-rays have a directly inverse action. They lessen the normal emission of light from the screen and increase the light emitted tangentially.

Macé de Lepinay has noted that sound vibrations increase the normal emission of light from the screen ; the author finds that these vibrations demand the tangential light. Electromotive and magnetic force act in a precisely similar manner.

E. Birchat, experimenting (*Comptes rend.*, **138,** 548) with N-rays dispersed by means of an aluminium prism, found silver to be the only metal which is perfectly transparent to all the rays ; palladium nickel, and iridium are opaque to all. Lead is not absolutely opaque when free from traces of oxide or carbonate, but, as usually met with, is so. A deal board coated with white-lead paint is quite opaque, while one covered with zinc white is transparent, so that the nature of a white paint may, in this instance, be determined by means of N-rays. It is found also that metal wires only conduct those N-rays to which they are transparent. For instance, a copper sheet allows the passage only of the most highly refractive rays. The rays conducted by a copper wire consist solely of those having this higher refractive index.

He also finds that gases at the critical point give off N-rays (*Comptes rend.*, **138,** 550), and that columns of liquid have the same property. If a screen be placed behind a Natterer tube containing CO_2, no increased phosphorescence is observable in the region of the gas. It becomes evident at the level of the liquid portion and increases as the length of the column is traversed, being greatest at the base. If the tube be heated above the critical point, it loses its excitant properties ; as it cools, however, a sudden and marked increase of the phosphorescence is noted at a certain point on the screen, a corresponding cloud of vapour appearing in the tube, indicating that condensation is taking place. Air also emits N-rays. If a cork with a delivery tube be fitted to a flask of liquid air, the passing gas excites phosphorescence. Ozone has the same property. A syphon of SO_2 is a convenient means of demonstrating the N-ray activity of gas under pressure and when relieved therefrom.

Action of the Magnetic Field on N- and N_1-rays. J. Becquerel states (*Comptes rend.*, **138,** 1584) that N- and N_1-rays are markedly susceptible to the influence of magnetic force, so that their influence on the phosphorescent screen is entirely removed if they pass normally through the magnetic field. If, however, they traverse the field in a direction parallel to the lines of force, their activity is in no way impaired. The intensely

active radiant emanations of radium salts, and the feebler rays given off by uranium salts, are similarly affected. It is advanced by the author, therefore, that N- and N_1-rays are not solely the effect of ethereal undulations, like light rays, but that these undulations are accompanied by a material radiation which, if not provoked, is at least facilitated by them.

J. Becquerel (*Comptes rend.*, **138,** 1486) finds that N- and N_1-rays are emitted by bodies undergoing contraction or expansion due to change of temperature, the dilatation being accompanied by the emission of N_1-rays, contraction resulting in the production of N-rays. Dutch drops are also a source of both N- and N_1-rays, the former being given out by the matter drawn out lengthwise and especially at the top of the drop; the former are emitted directly from the surface. The vapour of alcohol at first excites the emission of N-rays, the effect being less rapid but more lasting than in the case of chloroform vapour. As the amount of alcohol present increases, the N-ray emanation diminishes. N_1-rays are similarly diminished by the ultimate action of alcohol vapour. Metals are much more sensitive to the anæsthetic action of alcohol than calcium sulphide; if in conducting the experiments with N_1-rays the cone of aluminium employed be not protected by a sheet of glass, the metal becomes opaque as soon as it comes in contact with the alcohol. Steel behaves in a similar manner; it does not, however, appear to give off any N_1-rays. It is possible, therefore, that the first apparent excitation of calcium sulphide by alcohol may be due to suppression of the N_1-rays emitted simultaneously with the N-rays. N_1-rays are much more susceptible to the action of alcohol, and disappear under its influence sooner than N-rays.

An attempt to determine photographically the effect of N-rays has been made by E. Rothé (*Comptes rend.*, **138,** 1589). By exposing a photographic plate to the light emitted from a small phosphorescent spot of calcium sulphide, for a definite time, so as to obtain a succession of records, it is observed that the size of the photographs obtained diminishes regularly, as the phosphorescence decreases. If the same phosphorescent spot be then excited by N-rays, and another series of photographs taken, with the same length of exposure, it is found that the diminution of the phosphorescent power of the sulphide is distinctly prolonged, so that the spots on the plate practically become pairs, instead of showing a steady or even lessening from first to last. Although the method of recording the im-

pressions is as yet imperfect, it is a distinct step in advance, since hitherto no permanent evidence was available, the whole of the results being dependent on personal visual observation, which is necessarily imperfect and liable to error or variation.

Influence of the Colour of the Luminous Sources on their Sensibility to N-rays. G. Gutton observes (*Comptes rend.*, **138,** 1592) that the colour of luminous bodies materially affects their sensitiveness to the action of N-rays. Thus Charpentier has already recorded that, in physiological experiments, the best results are obtained when the phosphorescent screen is observed through blue or violet glass. Gutton finds that phosphorescent bodies which emit a violet light, such as calcium sulphide, are more sensitive to the action of N-rays than those with a green phosphorescence, such as the sulphides of the alkaline earths and zinc sulphide, whereas those substances which emit an orange phosphorescence are quite uninfluenced by N-rays. If the spectrum be examined in a dark chamber, it will be noted that the extension of the visibility is prolonged towards the ultra violet end by the action of N-rays. The eye is rendered more sensible to the perception of violet rays by the influence of N-rays, while its perceptive power of the orange and red rays is unaffected.

Physiological Sources and Properties of N-rays.

This portion of the interesting results obtained in the research into the properties of N-rays promises to yield data of great importance. A. Charpentier first observed that these rays were emitted by the muscles and nerves of both man and animals, when excited (*Comptes rend.*, **137,** 1049). The course of a superficial nerve was traceable by the screen ; special precautions were taken to avoid interference of heat rays from the body or stored N-rays. These N-rays given off by the muscles and nerves have some properties different from those originally observed by Blondlot (*Comptes rend.*, **138,** 45). Lead is not wholly opaque to them, and the nerve rays are partially arrested by aluminium, while muscular rays are not affected by that metal. The radiant energy of muscle tissue is shown to be independent of the nerve endings which are connected with it.

Continuing his researches, he found (*Comptes rend.*, **137,** 1277) that all the nervous centres showed a markedly greater emission of N-rays when the muscles corresponding to them were excited to action. Thus, the course of the spinal cord

was traceable along its whole course. When a contraction of the arm was made on one side, this could be traced along the spinal cord up to a certain point, a little below the bulb, when it passed over to the opposite side. Certain psycho-motor centres of the brain were also easily demonstrated by the rays during their special action. Thus, the region of Broca's centre became notably illuminated during the exercise of articulate speech; when the subject spoke in a loud voice, then in a whisper, the position of the brighter portion was altered. No such manifestation of phosphorescence was observed in the same locality on the right-hand side of the brain in the subjects treated. The functional activity of other zones would also be demonstrated. The author goes so far as to express the opinion that an indication could be obtained even of unexpressed thought.

E. Meyer soon reported (*Comptes rend.*, **138,** 101) that these rays were emitted by growing plants as well as by the animal organism. The plant gives off N-rays in varying quantities, as may be made evident by the feebly fluorescent screen. The most marked indications are given by the green parts, such as stems and specially leaves, but the emanations are feebly detectable from the flower. Roots, bulbs, and etiolated parts also give off the rays; but the greatest radiant activity appears at the point where the vegetable protoplasm is in its most active state, or is in process of evolution. Thus, with two tubes of cress sown on moist wool, one in active germination, the other only recently sown, the evidence of radiant energy was much more marked in the former, and was even obtained from the bottom of the tube, where the radicles had penetrated the wool in the course of their growth. On treating tissues in active growth with the vapour of chloroform so as to slacken their vital functions, the N-ray indications were correspondingly lessened.

Continuing his experiments (*Comptes rend.*, **138,** 272) he found that plants maintained from 4 to 6 days in a box, placed in a dark room, emit N-rays from their roots, leaves, and flowers. Sprouting onions, kept in the dark for 20 days, excited the phosphorescent screen almost as much as those grown during the same period in daylight. The slight difference, if any, might be attributed to the more active growth of the latter. Seeds sown in a hermetically-sealed cardboard box, kept in the dark, gave out N-rays as powerful as the same sown and grown in daylight, although the young plants of the former were etio-

lated. To eliminate the possibility of the interference of N-rays derived from exterior sources, or stored up, a sowing was made in a lead box, 4 mm. thick, which was covered with the same metal, and enveloped in paper which was kept wetted. A second sowing was made on moistened cotton wool, in a glass-stoppered vessel, which was then plunged beneath the surface of water. The latter seeds, therefore, germinated in full light, but protected from exterior N-rays. Both germinations, the one etiolated, the other green, excited the phosphorescence of the screen.

Lambert noted (*Comptes rend.*, **138,** 196) that the action of active soluble ferments, pancreatin and pepsin, is accompanied by the emission of N-rays.

G. Ballet records (*Comptes rend.*, **138,** 524) that in certain morbid states of the nerves and muscles the normal emission of N-rays is profoundly affected. In a case of primitive myopathia, with atrophy of certain muscles, the emission of N-rays was found to be diminished in proportion to the different degree of atrophy of the muscles of the affected area. A similar diminution was observed in the muscles affected by neuritis, and in atrophy dependent on infantile poliomyelitis. In three cases of hemiplegia, with contraction, due to cerebral lesion, and in two cases of hysterical paralysis, on the other hand, the N-ray energy, instead of being diminished, was markedly increased.

These results indicate, as well as those of subsequent observers, that the observation of N-ray energy may form a useful means of medical diagnosis.

Charpentier next stated (*Comptes rend.*, **138,** 584) that N-rays exercise a decided stimulation on the sensory organs, particularly on the olfactory apparatus. Any body emitting N-rays, such as a piece of tempered steel, or even muscles under a state of compression such as the clenched fist, increase the powers of smell. If the muscles of the ball of the thumb, held near the nose, are strongly compressed, the perception of odour is rendered more acute. Odorous bodies, such as essential oils, emit N-rays which pass through corks and aluminium. The sense of taste is also increased by the influence of the rays ; if some flavoured substance be placed on the tongue, or in the mouth, and a piece of steel be held near the open mouth, the perception of taste is markedly increased.

Subsequently the theory was advanced by J. Bequerel (*Comptes rend.*, **138,** 1204) that the increase of the phosphor-

escence observed on the screen under the action of N-rays is not real, but only apparent. The rays do not actually increase the light emitted from the screen, but the reflected N-rays given off by it stimulate the visual organs of the observer, and render the light more apparent, and so give rise to the impression of increased luminosity.

The *auditory sense* is also stimulated by N-rays. A. Charpentier found (*Comptes rend.*, **138,** 648) that when listening to the ticking of a watch reflected by a sounder, the perception of the sound was notably increased when a source of N-rays was approached to the ear.

A. Charpentier (*Comptes rend.*, **138,** 648) recorded many other sources of N_1-rays besides those enumerated by Blondlot, and shows that under certain conditions they are present in the physiological rays, as, for instance, when the muscles undergo a strong static contraction. N_1-rays produce on the nerves exactly the opposite effects to N-rays, dulling the perceptive power of the senses.

One of A. Charpentier's most interesting and suggestive notes (*Comptes rend.*, **138,** 772) is that in which he treats of the influence of powerfully toxic substances on the phosphorescent screen and the behaviour of the various parts of the body towards screens fixed on paper coated with certain alkaloids suspended in collodion. It was first noted that camphor, and many bases, when the phosphorescent spot was placed upon them, gave an increased emission of light compared with that obtained with an ordinary screen. The extraordinary phenomena was then observed that certain organs of the body have a selective affinity for these special screens, and that it is precisely those organs that are most affected physiologically by an internal dose of the substance which excite the luminosity of the particular screen coated with it. Thus, a card coated with digitaline, bearing a phosphorescent spot, was most excited by the heart; pilocarpine by the glands, and particularly the salivary glands. The atropine screen showed a brilliant light in the centre of the cardiac region; apomorphine in the region of the spinal bulb; nicotine in mastoid region; chloral about the brain; and santonin near the visual centres.

Anæsthetics are found by J. Becquerel (*Comptes rend.*, **138,** 1159) to modify the action of N-rays. When chloroform vapour is passed into a flask containing a source of the rays, through which a current of air is passing, and a phosphorescent

screen is placed behind it, the phosphorescence will be seen to be diminished as the $CHCl_3$ diffuses through the flask; as the anæsthetic is washed out by the current of air, the screen slowly regains its normal brightness. At first a brief increase of radiation on the introduction of the $CHCl_3$ may be observed, followed by gradual diminution to total extinction. Ether and nitrogen protoxide behave in a similar manner.

J. Meyer (*Comptes rend.*, **138,** 1335) finds that this anæsthetic property is also exercised on N_1-rays.

Influence of Anæsthetics on N-ray Radiations in Animals. J. Becquerel and A. Broca find (*Comptes rend.*, **138,** 1280) that although the administration of anæsthetics to animals profoundly modifies the N-ray activity of their nervous system, and especially of the brain, their action is not alike. At first, with all, the amount of N-rays emitted is greatly increased, especially by the brain matter, so that the location of the cerebral fissures may be readily indicated by the lessened light of the screen in passing over them. This emission is then decreased, and ultimately N_1-rays make their appearance. With *ether* the emission of N_1-rays only occurs when the life of the animal is in danger. With *chloroform* it occurs during the whole period of profound narcosis; it does not occur regularly, however, but shows irregular oscillations; N-rays often replace N_1-rays or *vice versa*, under the eye of the observer. As a rule they last about a minute. After a while these oscillations cease, the radiation continues permanently that of N_1-rays, until the animal regains consciousness, when N-rays again become apparent. With *chloral*, N_1-rays appear very quickly, become established permanently for 30 minutes, and after the recovery of the subject the same oscillations between N-rays and N_1-rays occur as are observed at the commencement of chloroform narcosis. With the spinal cord N_1-rays are not observed in the case of ether, and only for a very short period with chloroform and chloral narcosis. Even then they only appear long after the cerebral emission has been established, and they disappear long before they cease from the brain. They appear to indicate a period of profound narcosis. If during anæthesia N_1-rays are detected from the spinal cord, or even when the centres of N-ray activity can no longer be detected, the life of the animal is in danger, while the cessation of all radiation from the nervous centres for several minutes is a sign of certain death.

Death does not Cause the Cessation of N-ray Activity of the Nerves. A. Charpentier finds (*Comptes rend.*, **138,** 1351) that the nerves of frogs continue to give off these rays for some months after the death of the animal, and for six weeks even when dissected out.

Nail Polishes. (*Pharm. Centr.*, **44,** 626. See also *Year-Book*, **1903,** 336.) (1) Putty powder, 30 Gm.; carmine, 0·9 Gm.; rose oil, 6 drops; neroli oil, 5 drops. (2) Putty powder, 30 Gm.; powdered tragacanth, 6 Gm.; glycerin, 1 drop. Rose water sufficient to mass. Solution of carmine sufficient to give a pale rose tint. (3) Cinnabar, 3·75 Gm.; emery powder, 30 Gm.; bitter almond oil, 2 drops. After the use of either of the above, polish the nails by means of a leather with a solution of hard paraffin, 3·75 Gm. in chloroform, 60 Gm., perfumed with 3 drops of rose oil. By precipitating stannous chloride with soap solution, a mixture of the oleate and stearate of tin may be obtained, which has been employed for many years in America as a nail polish.

Naphthalin, Inefficacy of, as an Insecticide. M. P. E. Berthelot. (*Comptes rend.*, **137,** 953.) Contrary to the generally accepted opinion, the author finds that naphthalin has little or no action as a bactericide and insecticide. When scattered about a room at the agricultural station at Meudon, which was normally infested with flies of various species, naphthalin was found to be quite ineffectual as an insecticide, nor did the odour prevent them from swarming there as usual. They deposited their eggs, and the larvæ emerged in the normal manner, demonstrating that they were in no way influenced by the presence of naphthalin. Experiments conducted in other localities showed that naphthalin is quite inoperative on worms and larvæ. On the other hand, the vapours of formic, ethylic, benzylic and campholic aldehydes, ordinary camphor and analogous primary and secondary aldehydes, as well as turpentine, terpenes, the essential oils of wild and garden thyme, and of lavender, were all found to be effectual insecticides. The theory is advanced that these bodies owe their toxic action on insects to their well-known property of acting as carriers of oxgyen. Naphthalin, which has no such tendency, fails, on this account, to influence insect life.

Odorous Principles in Plants, Circulation of. E. Charabot

and G. Laloue. (*Comptes rend.*, **138,** 1229.) The observations of the authors on the terpenic constituents of living plants show that essential oils have their origin in the leaves, and are, in part, transferred from them to the stems. The oil of the leaves is markedly richer in soluble constituents, and this, in passing into the oil-saturated solution of the stems, causes the less soluble compounds to be thrown out of solution. The difference between the solubility of leaf and stem oil is less marked at the commencement of the vegetative season, but increases as the growth of the plant progresses.

Odours, Limits of the Olfactory Sense for. M. Berthelot. (*Comptes rend.*, **138,** 1249.) The limit of the sensibility of the sense of smell is put at about one billionth of a Mgm. for a c.c. of air. Supposing that, in the case of iodoform this amount is given off in an hour, the loss in weight will be slightly less than one hundredth of a Mgm. per year ; so that it will take 100 years for the iodoform to lose one thousandth part of its weight. With musk the loss is much, possibly ten times, less.

Paste Blacking. (*Corps. gras. industr.*, through *Nat. Drugg.*, **33,** 314.) Soap, 122 ; potassium carbonate, 61 ; beeswax, 500 ; water, 2,000 parts. Mix and boil together until a smooth, homogeneous paste is obtained, then add : Ivory black, 1,000 ; rock candy, powdered, 153 ; gum arabic, powdered, 61 parts, and mix thoroughly. Remove from the fire and pour while still hot into boxes.

Patent Leather Varnish. (*Spatula*, **9,** 680.) Resin, gum thus, Venice turpentine, of each, 1 oz. ; sandarach, 2 oz. ; shellac, 4 oz. ; methylated spirit, 30 fl. oz. ; lamp-black, ½ oz. ; Dissolve the resins in the turpentine, then add the lamp-black.

Perfumes for Toilet Soaps. (*Siefensieder Zeit.*, **31,** 130.) (1) Lavender oil, 4 ; caraway oil, 4 ; cassia oil, 2 ; clove oil, 2 ; fennel oil, 1 ; Japanese peppermint oil, 1 part. (2) Lemon grass oil, 6 ; citronella oil, 4 ; clove oil, 2 ; cassia oil, 1 part. (3) Clove oil, 10 ; patchouli oil, 5 ; citronella oil, 5 ; peppermint oil, 1 ; cassia oil, 5 ; artificial bitter almond oil, 2·5 parts. (4) Artificial bitter almond oil, 175 ; lavender oil, 15 ; petit-grain oil, 30 ; bergamot oil, 50 ; palmarosa oil, 35 ; coumarin, 10 ; heliotropin, 3 parts. (5) Citronella oil, 10 ; anise oil, 2 ; sassafras oil, 3 ; cassia oil, 1 ; clove oil, 1 ; peppermint oil, 2 parts.

(6) Lemon oil, 100; patchouli oil, 5; lavender oil, 20; bergamot oil, 30; clove oil, 20; coumarin, 5; ginger-grass oil, 10; cassia oil, 20 parts. (7) Cassia oil, 48; lavender oil, 52; lemon oil, 28; coumarin, 25; ginger-grass oil, 25; white thyme oil, 10; caraway oil, 10 parts.

Perfumes, Some Recent Formulæ for. (*Spatula*, 9, 411, 412, 413.) *Carnation Pink.* Clove oil, 5 ♏; cassie extract, 4 fl. oz.; jasmin extract, 2 fl. oz.; orange flower extract, 4 fl. oz. rose extract, 8 fl. oz.; essence of civet, 2 fl. oz.; essence of vanilla, 2 fl. oz.; tincture of storax, 1 fl. oz.; spirit of ylang ylang, 4 fl. oz. The spirit of ylang ylang is a solution of ylang ylang oil, and 2 drs. in alcohol 90 per cent., 20 fl. oz.

[The odour of clove or carnation may be much improved by substituting iso-eugenol for clove oil.—Ed. *Year-Book.*]

Chypre. Oil of rosemary, 100 ♏; oil of bitter orange, 240 ♏; oil of petit grain, 120 ♏; oil of bergamot, 150 ♏; oil of limetta, 240 ♏; alcohol 90 per cent., 80 fl. oz. Mix. After 4 days add distilled water, 10 fl. oz. Allow to stand for a fortnight, then filter.

Esterhazy Bouquet. Clove oil, 15 ♏; sandal oil, 15 ♏; essence of ambergris, 1½ fl. oz.; tincture of orris, 6 fl. oz.; essence of vanilla, 6 fl. oz.; tincture of Tonka bean, 6 fl. oz.; spirit of vetivert, 6 fl. oz.; spirit of neroli, 6 fl. oz.; orange extract, 1 fl. oz.; spirit of rose, 6 fl. oz. Spirit of vetivert is composed of vetivert oil, 2 drs.; alcohol 90 per cent., 40 fl. oz.

Night-blooming Cereus. Essence of civet, 2 fl. oz.; tincture of Tonka bean, 2 fl. oz.; tincture of benzoin, 4 fl. oz.; spirit of rose, 4 fl. oz.; jasmin extract, 4 fl. oz. Mix. The essence of civet in the above is thus prepared: Civet, 1 dr.; powdered orris, ½ oz.; ammonium carbonate, 10 grs.; alcohol, 15 fl. oz.; water, 1 fl. oz. Rub the civet with the orris. Dissolve the ammonium carbonate in the water; add to the spirit, and mix with the civet and orris. Bottle, and macerate for 1 month.

Caroline Bouquet. Lemon oil, 15 ♏; bergamot oil, 1 dr.; rose extract, 4 fl. oz.; tuberose extract, 4 fl. oz.; violet extract, 4 fl. oz.; tincture of orris, 2 fl. oz.; essence of ambergris, 1 fl. oz.; Mix and filter after 10 days.

Saratoga Nosegay. Musk essence, 4 fl. oz.; bergamot oil, 1½ dr.; jasmin extract, 2 fl. oz.; lavender oil, Mitcham, ½ dr.; neroli oil, ½ dr.; patchouli oil, 5 ♏; pimento oil, 5 ♏; otto of rose, 1½ dr.; verbena oil, 8 ♏; cassia oil, 5 ♏; alcohol

90 per cent., 80 fl. oz. Macerate 1 month, then filter. This resembles, but is superior to, Mona bouquet.

Buckingham Bouquet. Oil of lavender, 10 ♏ ; oil of neroli, 10 ♏ ; cassie extract, 8 fl. oz. ; jasmin extract, 8 fl. oz. ; otto of rose, 20 ♏ ; orange flower extract, 8 fl. oz. ; rose extract, 8 fl. oz. ; essence of ambergris, 4 fl. oz. ; tincture of orris, 4 fl. oz.

Bouquet d'Amour. Lavender oil, 2 drs. ; clove oil, 1 dr. ; bergamot oil, 1 dr. ; otto of rose, 2 ♏ ; essence of ambergris, 5 drs. ; essence of vanilla, 5 drs. ; alcohol 90 per cent., 1 pint.

Folkestone Bouquet. Musk, 30 grs. ; neroli oil, 30 ♏ ; lavender oil, 30 ♏ ; clove oil, 30 ♏ ; sandal oil, 30 ♏ ; otto of rose, 1 dr. ; bergamot oil, ½ fl. oz. ; millefleurs, 4 fl. oz. ; jasmin extract, 4 fl. oz. ; tincture of Tonka bean, 4 fl. oz. ; tincture of orris, 4 fl. oz. ; triple rose water, 10 fl. oz. ; triple orange flower water, 10 fl. oz. ; alcohol 90 per cent., 80 fl. oz.

Frangipanni. Sandal oil, 1 dr. ; neroli oil, 1 dr. ; rose geranium oil, 1 dr. ; otto of rose, 2 drs. ; essence of civet, 4 drs. ; spirit of vetivert, 1 fl. oz. ; tincture of orris, 3 fl. oz. ; orange flower extract, 3 fl. oz. ; tuberose extract, 3 fl. oz. ; essence of musk, 5 fl. oz.

Germania Bouquet. Musk, 3 grs. ; coumarin, 6 grs. ; vanillin, 15 grs. ; storax, 10 drs. ; oil of bitter almonds, 8 ♏ ; oil of orris root, 15 grs. ; otto of rose, 30 ♏ ; neroli oil, 30 ♏ ; oil of rose geranium, 1½ dr. ; tuberose extract, 15 fl. oz. ; jasmin extract, 15 fl. oz. ; alcohol 90 per cent., 5 pints. Macerate for 1 month, then filter.

White Heliotrope Bouquet. Heliotropin, 120 grs. ; white rose extract, 1 fl. oz. ; jasmin extract, 1 fl. oz. ; essence of musk, 4 drs. ; alcohol 90 per cent., 4 pints.

Phosphorescence Excited by Ponderable Matter Given off by Certain Substances. R. Blondlot. (*Comptes rend.*, **138**, 1473.) It is found that when a small mark, such as a cross, of phosphorescent calcium sulphide is held directly under a silver coin, the brilliancy of the phosphorescence is increased, quite independently of the distance of the coin from its surface, provided the metal disc be directly over the mark. If the coin be held beneath the mark, however, no increased phosphorescence is visible if it be withdrawn to a distance of about 6 cm. That is to say, the particles emitted by the disc, which excite the screen, can fall perpendicularly almost any distance on the screen beneath ; but they cannot be projected vertically above

a certain height. On fixing the coin so that its plane is vertical, the emanation is found to fall in two curves, similar to those of two streams of slowly emitted liquid, from the two surfaces of the coin. By varying the relative positions of the coin and the phosphorescent mark, the stream of exciting matter could be traced, in its descent, exactly like a jet of fluid. Moreover, it could be carried along an inclined glass tube; if one end of this were placed under the coin, and the phosphorescent mark at the other lower end, the tube being inclined, the mark became increasedly luminous. This stream of matter will pass through paper, cardboard, and even a plank 2 cm. thick, but is almost totally arrested by a sheet of glass, against which it splashes like a jet of water. In addition to silver, copper, lead, zinc and moist cardboard give off this emanation, but gold, platinum, glass and dried cardboard do not.

In a subsequent communication (*Comptes rend.*, **138,** 1676) the author states that this stream of excitant matter is susceptible to magnetic influence, and may be deviated by the proximity of a magnet, when the lines of magnetic force cross the trajectory of the falling particles at an angle, but the effect is nil when the magnetic influence is vertical to the stream of matter. It was also noted that the stream of the emanation was deviable by a current of air. A fan worked 2 metres away had a marked influence on the course of the falling stream.

Picric Acid Stains, to Remove. J. Bougault. (*Journ. Pharm. Chim.* [6], **18,** 158.) The spot is rubbed with a solution of any alkaline sulphide or polysulphide, then washed with soap and water. The treatment reduces the NO_2 groups to HN_3, and thus removes the intense colouring. Excess of sulphide, which would give a dark colour in contact with most metals, may then be removed by moistening the spot with a little H_2O_2 acidified with HCl. This oxidizes the sulphides into sulphate.

Pinafore Bouquet. (*Spatula*, **9,** 547.) Coriander oil, 10 ♏; thyme oil, 10 ♏; balm oil, 20 ♏; cardamom oil, 40 ♏; citron oil, 1 dr.; bergamot oil, 2 drs.; essence of musk, 1 fl. oz.; spirit of neroli, 8 fl. oz.; violet extract, 12 fl. oz.; spirit of rose, 16 fl. oz.

Polishing Paste. (*Spatula*, **10,** 92.) Infusorial earth (kieselguhr), 8 oz.; paraffin, 2 oz.; lubricating oil, 6 fl. oz.; oleic acid, 1 fl. oz.; oil of mirbane, 30 ♏. Melt the paraffin with the lubri-

cating oil, and mix with the infusorial earth, then add the oleic acid and oil of mirbane.

Pot Pourri Powders. (*Spatula*, **9,** 673.) In the following formulæ the solid ingredients should be freshly ground immediately before mixing, to a coarse powder:—

1. Lavender flowers, 1 lb.; rose petals, 1 lb.; orris root, 1 lb.; salt, 8 oz.; cloves, 4 oz.; cinnamon, 4 oz.; benzoin, 4 oz.; pimento, 4 oz.; vanilla, 3 oz.; musk-pod skins, 1 oz.; English lavender oil, 1 dr.; sandal oil, 1 dr.; rose geranium oil, 1 dr.; bergamot oil, 2 drs.; lemon oil, 2 drs.; essence of ambergris, ½ fl. oz.; otto of rose, 10 ♏. Mix intimately.

2. *Lord Plymouth's Pot Pourri.* Siam benzoin, 8 oz.; freshly ground orris root, 8 oz.; freshly ground angelica root, 8 oz.; storax, 8 oz.; grain musk, 20 grs.; Tonka beans, 4 in number; mace, ½ oz.; cloves, ½ oz.; crushed cinnamon bark, ½ oz. Mix, and add: English lavender oil, 1 dr.; otto of rose, 1 dr.; rose petals, 4 oz.; lavender flowers, 4 oz.

Preservation of Books in Hot Climates. F. Browne. (*Pharm. Journ.* [4], **17,** 41.) Books in hot climates quickly deteriorate unless carefully seen after. There are three destructive agencies which have to be guarded against: (1) damp; (2) a small black insect; (3) cockroaches.

1. Books which are kept in a damp atmosphere deteriorate on account of moulds and fungi which grow rapidly when the conditions are favourable. Books are best kept on open, airy, well-lighted shelves. When there has been a prolonged spell of moist weather their covers should be wiped, and they should be placed in the sun or before a fire for a few hours. Damp also causes the bindings and leaves of some books to separate.

2. A small black insect, ⅛ in. long, and $\frac{1}{16}$ in. broad, somewhat resembling a beetle, is very destructive, and books will be found, if left untouched, after a few months to have numerous holes in the covers and leaves sufficiently large for the animal to pass through. If this insect be allowed plenty of time for its ravages it will make so many holes that bindings originally strong can be easily torn in pieces. All damage may be prevented by coating the covers of books with the varnish described under 3. When books are found to contain the insects they should be well rapped and put into the sun before varnishing.

3. The appearance of a fine binding may be destroyed in a

single night by cockroaches. The lettering of the binding may, in 2 or 3 days, be completely obliterated.

The following varnish has been found to prevent effectually the ravages of cockroaches and of all insects that feed upon books: Dammar resin, 2 oz.; mastic, 2 oz.; Canada balsam, 1 oz.; creosote, ½ oz.; spirit of wine, 20 fl. oz.

Macerate with occasional shaking for a few days if wanted at once, but for a longer time when possible, as a better varnish will result after a maceration of several months.

Where it is necessary to keep books or paper of any description, in boxes, cupboards, or closed book-cases, some naphthalin balls or camphor should be always present with them. If camphor be used it is best to wrap it in paper, otherwise it volatilizes more quickly than is necessary.

Princess Bouquet. (*Spatula*, **9**, 410.) Spirit of rose, 1 pint; extract of violet, 30 fl. oz.; extract of jasmin, 30 fl. oz.; extract of tuberose, 21 fl. oz.; tincture of orris, 5 fl. oz.; essence of vanilla, 3 fl. oz.; extract of cassie, 20 fl. oz.; extract of rose, 40 fl. oz.; extract of orange, 6 fl. oz.; essence of musk, 4 fl. oz.; essence of ambergris, 2 fl. oz.; oil of French geranium, 50 ♏; oil of patchouli, 10 ♏.

Putz Pommades. (*Nat. Drugg.*, **33**, 67.) (1) Dried sodium carbonate, 1; tallow soap, 4; levigated emery, 25; water, 25. Heat on the water-bath and stir until smooth. (2) Jewellers' rouge, 1; petrolatum, 1; oil of mirbane, q.s. to perfume. (3) Oil of turpentine, 1; finest levigated emery, 1; jewellers' rouge, 2; petrolatum, 2; oil of mirbane, q.s. Rub together. (4) Finest levigated emery, 5; jewellers' rouge, 5; mutton suet, 4; crude oleic acid, 4; perfume, q.s. Melt the suet and oleic acid together in the water-bath and remove from the fire. When cool, but still soft, add the powders and rub down until smooth. (5) Stearin, 8; mutton suet, 32; neat's-foot oil, 2; jewellers' rouge, 20; precipitated chalk, 40 parts. Proceed as in No. (4). (6) Finest levigated quartz sand, 2; jewellers' rouge, 3; petrolatum, 5 parts. Mix. Instead of quartz sand levigated infusorial earth may be used.

Rats, Resistance of, to Arsenic. F. Bordas. (*Comptes rend.*, **138**, 836.) Rats appear to be endowed with great powers of resistance to arsenical poisoning, compared with other mammals. They will support a dose twice as great as the recognized lethal dose for man. Although, however, rats will resist a dose of

arsenic 6 or 7 times greater than will be borne by guinea pigs, this is only so if the poison be given in one large dose. If for 2 or 3 days rats be treated with relatively very small doses, their resisting power to a toxic dose becomes diminished by one half. Some individuals, however, appear, even then, to retain a remarkable immunity to the poison, and will bear, with apparent indifference, daily doses of 5 Gm. of sodium arsenate. If they be ill-fed, they become more susceptible to the poison; it is, under these conditions, twice or thrice as toxic as it is to well-fed animals. But even well-nourished animals will not tolerate small successive doses equivalent to the amount they will bear in one large dose. [These results confirm the experience of many, that arsenical poisons are not so certain in action on these rodent pests as strychnine or phosphorus.—Ed. *Year-Book.*]

Rosamond Lotion. J. F. O'Connell. (*Amer. Drugg.*, **41,** 269.) Almond oil, ʒvi.; spermaceti, ʒx.; boric acid, ʒij.; glycerin, ʒx.; rose water, ʒxviij.; simple tincture of benzoin, ʒiij.; alcohol, ʒiij.; rose oil, gtt. xx.; neroli oil, gt. xx. Melt the spermaceti in the almond oil on a water-bath and transfer the hot mixture to a warmed mortar. Dissolve the boric acid in the rose water and add the glycerin, and gradually incorporate the solution so formed to the melted spermaceti and oil contained in the mortar, stirring vigorously the while. In the alcohol dissolve the oils, and the tincture of benzoin, and add this to the cream first formed, mixing all thoroughly.

Rose Glycerin Jelly. J. F. O'Connell. (*Amer. Drugg.*, **41,** 269.) Gelatin (best French), ʒi.; water, ʒx.; glycerin, ʒxx.; boric acid, ʒss.; rose water, ʒx. Soak the gelatin in the water for 12 hours, then melt on a water-bath, add the glycerin and the rose water, in which the boric acid had been dissolved. Then tint with carmine and strain.

Rouge, Theatrical. (*Nat. Drugg.*, **33,** 316, 317.) *Rouge Palettes.* Rub together: Carmine, 9; French chalk, 50; almond oil, 12 parts. Add enough tragacanth mucilage to make the mass adhere, and spread the whole evenly on the porcelain palette.

Liquid Rouge. The best quality of liquid rouge is made as follows: Carmine, 4; strong solution of ammonia, 4; essence of rose, 16; rose water to make 500 parts. Mix. A violet odour, if this is preferred, may be obtained by using ionone in

place of rose essence. A cheaper preparation may be made as follows: Eosine, 1; distilled water, 20; glycerin, 5; Cologne water, 75; alcohol, 100 parts. Mix.

Rouge Tablets. Carmine, 10; talc, in powder, 25; dextrin, 8 parts; simple syrup, q.s.; perfume, to taste, q.s. Mix the talc and dextrin and add the perfume, preferably in the shape of an essential oil (otto of rose, synthetic oil of jasmin, or violet, etc.), using 6–8 drops to every 4 oz. of other ingredients. Incorporate the carmine and add just enough simple syrup to make a mass easily rolled out. Cut into tablets of the desired size. Instead of carmine, a saturated solution of carmine in strong solution of ammonia may be employed.

Ryde Bouquet. (*Spatula*, **9**, 548.) Lemon oil, 1 dr.; otto of rose, 80 ♏; essential oil of bitter almonds, 7 ♏; neroli oil, 30 ♏; grain musk, 14 grs.; rasped orris root, 3 oz.; crushed Tonka beans, 2 drs.; jasmin extract, 4 fl. oz.; alcohol 90 per cent., 44 fl. oz. Macerate for 7 days and filter.

Sachet Powders. (*Spatula*, **9**, 674.) *Chypre Sachet.* Powdered orris root, 1½ lb.; rasped cedarwood, 1 lb.; rasped sandalwood, 1 lb.; vanilla (ground), 4 oz.; Tonka bean (ground), 2 oz.; essence of musk, 1 oz.; oil of rose geranium, ½ dr.; otto of rose, 25 ♏; oil of bergamot, 25 ♏. Mix.

Bouquet Sachet. Powdered orris root, 2 lb.; powdered sandalwood, 2 lb.; powdered orange peel (sweet), 2 lb.; artificial musk, 1 gr.; coumarin, 2 grs.; vanillin, 2 grs.; otto of rose, 90 ♏; oil of bergamot, 2 drs.; oil of ylang ylang, 20 ♏; oil of neroli, 20 ♏; oil of rose geranium, 15 ♏; oil of cinnamon, 5 ♏; essential oil of almonds, 5 ♏; jasmin extract, 2 fl. oz.

Frangipanni Sachet. Powdered orris root, 2 lb.; rasped sandalwood, 4 oz.; ground vanilla, 4 oz.; ground Tonka bean, 2 oz.; oil of neroli, 1 dr.; oil of rose geranium, 1 dr.; oil of bergamot, 1 dr.; oil of sandalwood, 40 ♏; otto of rose, ½ dr.; oil of vetivert, 10 ♏; essence of musk, 1 oz.; essence of civet, ½ oz. Mix.

Heliotrope Sachet. Powdered orris root, 1 lb.; powdered vanilla, 4 oz.; powdered benzoin, 1 oz.; musk, 5 grs.; civet, 15 grs.; essential oil of almonds, 10 ♏; otto of rose, 10 ♏. Mix. [This may be improved by the addition of heliotropin, 2 drs; terpineol, 30 ♏.—Ed. *Year-Book.*]

Ylang Ylang Sachet. Powdered orris root, 3 lb.; ground

cassie flowers, 1 lb.; rose petals, 1 lb.; ground pimento, 4 oz.; ground Tonka beans, 2 oz.; ground vanilla, 2 oz.; ground benzoin, 1 oz.; essence of musk, 1 oz.; essence of civet, ½ oz.; oil of bergamot, 2 drs.; oil of ylang ylang, 2 drs.; oil of pimento, 1 dr.; oil of rose geranium, 1 dr.; otto of rose, 20 ♏.

Jockey Club Sachet. Sweet-orange peel, dried and ground, 2½ lb.; powdered orris root, 1½ lb.; ground rose petals, 1½ lb.; Siam benzoin, 4 oz.; ground sandalwood, 2 oz.; cloves, 1 oz.; coumarin, 10 grs.; musk, 1 gr.; civet, 1 gr.; otto of rose, 1 dr.; oil of bergamot, 1½ dr.; oil of rose geranium, ½ dr.; oil of neroli, ½ dr.; oil of cinnamon, 10 ♏; oil of bitter almonds, 10 ♏; oil of ylang ylang, 10 ♏; jasmin extract, 4 fl. oz.

Lavender Sachet. Ground lavender flowers, 16 oz.; ground benzoin, 1 oz.; oil of lavender, ½ oz.; essence of musk, ½ oz. Mix.

Millefleurs Sachet. Powdered orris root, 2 lb.; ground lavender flowers, 1 lb.; ground cassie flowers, 1 lb.; ground rose flowers, 1 lb.; ground sandalwood, 8 oz.; ground Tonka beans, 4 oz.; ground benzoin, 4 oz.; ground vanilla, 3 oz.; ground cinnamon, 2 oz.; ground cloves, 2 oz.; essence of musk, ½ oz.; essence of civet, ½ oz.; oil of bergamot, ½ oz.; oil of rose geranium, ½ dr.; oil of patchouli, 40 ♏. Mix.

Opoponax Sachet. Powdered orris root, 3 lb.; ground rose petals, 1 lb.; ground cassie petals, 1 lb.; ground Tonka beans, 4 oz.; ground vanilla, 3 oz.; ground musk-pod skins (or essence of musk), 1 oz.; essence of civet, ½ oz.; bergamot oil, 2 drs.; rose geranium oil, 1 dr.; citron oil, ½ dr.; patchouli oil, ½ dr.; citronella oil, 15 ♏; otto of rose, 5 ♏. Mix.

Rondeletia Sachet. Powdered orris root, 3 lb.; ground lavender flowers, 1½ lb.; ground cloves, ½ oz.; essence of musk, 1 oz.; essence of ambergris, 1 oz.; oil of bergamot, 2 drs.; English oil of lavender, 2 drs.; oil of cloves, 2 drs.; oil of rose geranium, 30 ♏; otto of rose, 20 ♏. Mix.

Rose Sachet. Ground rose petals, 1½ lb.; powdered orris root, 8 oz.; yellow sandalwood sawdust, 4 oz.; ground patchouli leaves, 2 oz.; essence of civet, ½ oz.; oil of rose geranium, 30 ♏; otto of rose, 20 ♏. Mix.

Lign-aloe Sachet. Powdered orris root, 2½ lb.; ground rose leaves, 1 lb.; ground sandalwood, 8 oz.; ground vanilla, 4 oz.; oil of lign-aloe, 1 oz.; essence of civet, 1 oz.; essence of musk, ½ oz.; oil of rose geranium, 40 ♏; otto of rose, 20 ♏. Mix.

New-mown Hay Sachet. Powdered orris root, 2 lb.; ground Tonka beans, 4 oz.; ground vanilla, 2 oz.; essence of musk, 6 drs.; oil of rose geranium, 1 dr.; oil of bergamot, ½ dr.; otto of rose, 15 ♏; oil of almonds, 5 ♏. Mix.

Saponaceous Tooth Paste. (*Pharm. Zeit.*, **48,** 855.) Potassium chlorate, 20 Gm.; powdered white soap, 10 Gm.; precipitated chalk, 20 Gm.; peppermint oil, 15 drops; clove oil, 5 drops; glycerin, q.s. to mass. To be used with a soft brush.

Shampoo, Egg. (*Spatula*, **10,** 35.) (1) Spirit of soap, 100 Gm.; solution of ammonia, 10 Gm.; lemon oil, 3 Gm.; rose geranium oil, 1 Gm.; water, 810 Gm.; yolks of 4 eggs. Mix the egg yolks intimately with the ammonia, gradually add the water, then the perfumes. Shake well together and strain. (2) Three eggs; spirit of soap, 4 fluid drs.; potassium carbonate, 160 grs.; solution of ammonia, 160 ♏; coumarin, $\frac{1}{10}$ gr.; otto of rose, 2 drops; bergamot oil, 2 drops; geranium oil, 1 drop; essential oil of almonds, 1 drop; rose water, 27 fl. oz. Thoroughly beat the eggs and dilute with the rose water; then add the other ingredients. If desired in paste form, add less rose water, to the required consistence.

Shampoo Pastes. (*Spatula*, **10,** 35.) (1) Soft soap, 1 oz.; solution of potash, 2 fl. oz.; alcohol 90 per cent., 2 fl. oz.; perfume, to suit. (2) Soft soap, ½ oz.; powdered borax, 1 dr.; solution of ammonia, 1 dr.; eau de Cologne, ½ fl. oz. (3) White Castile soap, 4 oz.; powdered curd soap, 2 oz.; potassium carbonate, 1 oz.; honey, 1 oz.; perfume, to suit.

Shaving Cream. (*Nueste Erfind. und Erfahr.*, through *Pharm. Centr.*, **44,** 107.) Lard, 10; olive or sesame oil, 8; coconut oil, 7 parts, are melted together at 35°C., and saponified by the addition of caustic potash solution (40 percent.), 12·5, and pearlash solution (15 per cent.), 1·5; the alkaline solutions being added in a thin stream and the mixture constantly stirred until saponification is complete and the mass becomes thick. It may then be perfumed with lavender, spike, lemon, and thyme oils.

Sicilian Bouquet. (*Spatula*, **9,** 548.) Mitcham lavender oil, 3 drs.; clove oil, 30 ♏; bergamot oil, 4 drs.; sandal oil, 20 ♏; otto of rose, 1 dr.; ambergris essence, 4 drs.; musk essence,

1½ fl. oz. ; essence of heliotrope, 4 drs. ; marechale extract, 1 oz. ; alcohol 90 per cent., 8 fl. oz.

Silver Marking Ink. (*Spatula*, **9,** 85.) The best silver marking ink is made as follows : Dissolve silver nitrate, 3 oz., and pure sodium carbonate, 3 oz., separately, in a quantity of hot water ; mix the solutions in a large bottle, allow the precipitate to subside, decant the liquid and wash the precipitate, by decantation, with two washings of distilled water. Collect and drain the precipitate, washing it further if necessary until the washings are no longer alkaline. Transfer to a mortar, rub down with 10 drs. of tartaric acid, and when effervescence has ceased add 3 fl. oz. of strong solution of ammonia, or enough to produce a clear solution. In this dissolve sugar, 1½ oz. ; powdered gum acacia, 1 oz. ; water-soluble chlorophyll, 1 oz. ; archil, 1 oz. ; and add sufficient water to produce 1 pint.

Silver Soap. (*Spatula*, **10,** 92.) Coconut oil soap, 1 ; hot water, 1 ; finest prepared chalk, 2 parts. Melt the soap in the water and incorporate the chalk.

Soothing Ointment. (*Report Nat. Form. Committee : Proc. Amer. Pharm. Assoc.*, **51,** 398.) Resorcin, 60 Gm. ; zinc oxide, 60 Gm. ; bismuth subnitrate, 60 Gm. ; cade oil, 120 c.c. ; petrolatum, 350 Gm. ; hydrous wool fat, 350 Gm. Powder the resorcin and mix. This ointment darkens on exposure to light and air, so should be kept in well-closed containers.

Sparkling Beverage, Cheap and Wholesome. (*Rev. Méd. Pharm.*, **10,** 75.) Take a 12 or 14-gallon clean cask and nearly fill it with water, leaving room for about another ½ gallon of liquid ; add to it a pint of good vinegar. Take a square of clean washed muslin and tie up in it about 3½ lb. of white sugar and 1½ oz. of dried elder flowers. Suspend the muslin in the cask, introducing it through the bung hole, which has been previously enlarged for that purpose, so that its contents are immersed beneath the surface of the water. In 5 or 6 days withdraw the bag, stir the liquid with a stick, allow it to stand for a day, then bottle off. Take care to stand the bottles upright. As a rule, the beverage will be fit to drink after being in bottle for about 8 days.

Stephanotis Bouquet. (*Spatula*, **9,** 548.) Otto of rose, 30 ♏ ; neroli oil, 30 ♏ ; bergamot oil, 1 fl. oz. ; cassie extract, 4 fl. oz. ;

tuberose extract, 4 fl. oz.; simple tincture of benzoin, 4 fl. oz.; tincture of storax, 4 fl. oz.; tincture of Tonka bean, 3 fl. oz.; tincture of orris, 8 fl. oz.; alcohol 90 per cent., 16 fl. oz.; essence of musk, 24 fl. oz.; jasmin extract, 24 fl. oz.

Substances Liable to Decomposition by Light. F. A. Upsher Smith. (*Pharm. Journ.* [4], **18,** 747.) A complete list of the chemicals and galenicals prone to be affected by light is given. Amber-tinted glass bottles are generally recommended or the preservation of these articles.

Sunburn and Complexion Lotion. (*Journ. des Practs.*, through *Nouv. Remèdes.* **20,** 23.) Corrosive sublimate, 1; dissolve in orange-flower water, 150, and add dilute hydrochloric acid, 10. Emulsify bitter almonds, 90, with orange-flower water, 500; strain and add glycerin, 50 parts. Mix the solution of corrosive sublimate with this emulsion. Apply to the sunburns or red spots at night with a sponge, allowing the application to dry on.

Toilet Ammonia. (*Amer. Drugg.*, **42,** 314.) Solution of ammonia (10 per cent.), 250 fl. parts; green soft soap, 120; oleic acid, 10; oil of myrcia acris, 1; oil of rosemary, 1; oil of verbena, 5; water to produce 1,000 fluid parts. Dissolve the soap in warm water, 500 parts. When cool, add the ammonia, the essential oils, the oleic acid, and lastly enough water to make up the volume.

Toison's Fluid (for Blood Counts). P. H. Marsden. (*Pharm. Journ.* [4], **18,** 803.) Methyl violet (5 B.), 0·025; sodium chloride, 1·000; sodium sulphate, 8·000 Gm.; neutral glycerin, 30 c.c.: distilled water, 160 c.c.

Toothache Remedy. (*Apoth. Zeit.*, **19,** 87, after *Monde Pharm.*) Orthoform, 1; crystalline phenol, 1; camphor, 4; chloral hydrate, 4 parts. To be applied with cotton wool to the hollow tooth.

Tubercle Bacilli in Urine, Method of Demonstrating. Edgar Trevithick. (*Brit. Med. Journ.* [1], **1904,** 13.) It is found that the following method of washing the deposit from tuberculous urine renders the detection of the specific bacilli simpler than is the case with sputum. The lower part of the urine which has been resting in a conical glass is pipetted off and centrifugated; and the supernatant fluid is carefully decanted from the minute collection of deposit which will be found

adhering to the bottom of the glass. The glass is then filled with distilled water, and the deposit shaken up with it. This is once more centrifugated, and after that the foregoing process is once more repeated. From the final deposit films are prepared and stained in the usual manner. The number of tubercle bacilli found in such films will be very greatly in excess of those that will be demonstrated from the same urine where this precaution of washing away the urinary salts is not followed.

Universal Domestic Ointment. (*Spatula*, **9**, 680.) Zinc ointment, lanoline, petrolatum, boric acid ointment, of each, 8 oz.; solution of basic lead acetate, 6 drs.; liquor carbonis detergens, 6 drs. Mix well.

Urea, Some Properties of. W. Ramsden. (*Journ. State Med.*, **9**, 297, through *Pharm. Journ.* [4], **17**, 481.) Pure urea has some remarkable properties. Saturated solutions of it prevent the coagulation of all proteids by heat; they swell up and dissolve in saturated aqueous solution of urea. Dry gelatin is dissolved at ordinary temperatures, forming a 40 per cent. solution; coagulable albumins, in the cold, are converted into bodies possessing all the properties of alkali and acid-albumin according as the solution of urea used is either acid or alkaline. Urea accelerates the digestion of fibrin by pepsin, up to 10 per cent.; in larger quantities it retards the digestive action. A dead frog, placed in saturated urea solution, became translucent and fell to pieces in a few hours. The ligaments, tendons, and connective tissue were converted into a clear, soft jelly. The muscles, after maceration in urea solution, if shaken briskly in water, fall completely into individual muscular fibres, which retain their structure and make admirable histological specimens. The hæmoglobin of the blood is converted into a body resembling alkaline hæmatine. The skin brushes away on the slightest touch. Nervous tissue becomes semi-transparent, and the nerves easily rupture. No putrefaction ever takes place in saturated urea solutions. This action of urea solution makes it a valuable histological reagent; tissues can be preserved in it indefinitely, and after a short immersion in water may afterwards be stained in the usual way.

Vanilla Essence. F. Lorenzen. (*Pharm. Zeit.*, **48**, 691.) Cut up, as finely as possible, 20 parts of vanilla bean and rub to a coarse powder by the aid of 40 parts of dry milk sugar. Moisten with

10 parts of dilute alcohol, 68 per cent., pack somewhat loosely in a closed percolator and let stand for 2 hours. Now add 40 parts of dilute alcohol, close the percolator and let stand 8 days. At the end of this time add 110 parts of dilute alcohol, and let pass through. The residue will repay working over again. Dry it well, add 5 parts of vanillin and 110 parts of milk sugar, pass through a sieve, then treat as before.

Vanillin, Oxidation of, by Russula Ferment and by Gum Acacia. R. Lerat. (*Journ. Pharm. Chim.* [6], **19,** 10.) The aqueous maceration of fresh *Russula delica* and *R. fetens* is found to exercise a marked oxidizing action on vanillin in aqueous solution, converting it into the odourless dehydro-divanillin of Tiemann. When the aqueous solution of the ferment is mixed with an equal volume of 2 per cent. aqueous vanillin solution, the mixture rapidly becomes turbid and forms a precipitate. The action is accelerated by the passage of a current of moist air through the liquid. The precipitate, when collected and dried, is insoluble in most organic solvents, but is readily dissolved by dilute alkalies. It may be liberated from this combination by a current of CO_2; when purified by this treatment it melts at 302–305°C., and agrees in every detail with dehydro-divanillin obtained by the action of Fe_2Cl_6 on vanillin. Gum acacia is found to act in a similar manner, but more slowly. A 20 per cent. mucilage removed all odour of vanillin from an equal volume of a 1 per cent. aqueous solution in 10 days. The precipitate formed in this case was also dehydro-divanillin.

[This second experiment has a practical interest, showing that mucilage of acacia should not be used, as is sometimes the case, by confectioners, as an ingredient in any confection which it is desired to flavour with vanillin.—Ed. *Year-Book.*]

Victoria Bouquet. (*Spatula*, **9,** 548.) Essential oil of almonds, 3 ♏; neroli oil, 4 ♏; cinnamon oil, 6 ♏; otto of rose, 16 ♏; clove oil, 1 dr.; lemon oil, 2 drs.; bergamot oil, 2 drs.; millefleurs, 2 drs.; violet extract, 2 drs.; jasmin extract, 2 drs.; musk essence, 3 drs.; ambergris essence, 3 drs.; alcohol 90 per cent., 12 fl. oz.

Viper Venom, Natural Immunity of Vipers and Snakes towards. C. Phisalix. (*Comptes rend.*, **187,** 270.) Some investigators have stated that the immunity of vipers to viper venom is complete, others that it is non-existent, or merely

modified. The author has re-investigated the subject. He finds that vipers are so far tolerant of viper venom that they are practically, but not absolutely, immune to it. The lethal dose, either when the venom is introduced subcutaneously or into the peritoneum, is 500 or 600 times greater than it is for guinea-pigs. If, however, the venom be brought in direct contact with the brain of the snake, the relative immunity is much less marked, not exceeding 25 to 30 times that of the guinea-pig. A viper may, therefore, be killed when fighting with another if the poison fangs penetrate the skull; but since the skull bones of these snakes are exceptionally hard, this is not likely to occur under ordinary conditions. It may, therefore, be concluded that viper venom is not a poison for vipers under the natural conditions of inoculation.

Walnut Hair Dye. (*Pharm. Zeit.*, **48,** 526.) Bruised green walnut shells, 45; alum, 3; distilled water, 12 parts, are macerated together for 48 hours and pressed. The liquid thus obtained is preserved with alcohol, 30; set aside to deposit, and filtered.

Welding Powders for Iron and Steel. (*Neueste Erfind. und Erfahr.*, through *Pharm. Centr.*, **45,** 49.) (1) Borax, 2; sal ammoniac, 1; water, 1 part, are heated together to complete dryness, then powdered and mixed with one-third its weight of wrought-iron filings. The pieces of iron to be welded are made red hot, sprinkled with the powder, and, when this fuses, welded together. (2) Borax, 2; wrought-iron filings, free from rust, 2; sal ammoniac, 9 parts. Mix and mass with copaiba balsam, dry, and reduce to powder.

For welding steel to wrought iron the following is recommended: Borax, 300; potassium cyanide, 200; Prussian blue, 1 part. Powder together and add wrought-iron filings, free from rust, 100 parts.

White Lilac Bouquet. (*Spatula*, **9,** 480.) Terpineol, 75 m; essence of ambergris, 40 m; essence of musk, 40 m; jasmin extract, 7 fl. oz.; jonquil extract, 7 fl. oz.; orange-flower extract, 7 fl. oz.; rose extract, 7 fl. oz.; tuberose extract, 7 fl. oz.

Window Frosting. (*Rev. Méd. Pharm.*, **10,** 758.) Magnesium sulphate, 3; zinc sulphate, 3; dextrin, 2; water, 20 parts. Apply with a brush.

Yeast in Glanders. — Ludewig and — Petersen. (*Merck's Report*, **17**, 75.) Yeast, or a preparation of it known as furunculin, which is stated to be yeast deprived of its propagating powers, is stated to be a specific for glanders. Doses of $1\frac{3}{4}$–$3\frac{1}{2}$ oz. rapidly reduced the temperature and caused the disappearance of the glandular swelling in horses affected with the disease. It is also applied locally, and has given good results in cellulitis and suppurating wounds, as well as internally as a general antiseptic in veterinary practice.

RESEARCH LIST, 1904.

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The following subjects are suggested for investigation, and the Executive Committee hopes that members of the B.P.C. will undertake to work on one or more of these questions. New subjects have been added to the list to replace those worked out. The Hon. Secretaries wish to call attention to the fact that a special fund has been raised to defray expenses connected with research work. The Executive Committee will be glad to receive applications from members for grants from the above fund.

Plant Analysis.

1. *Arnica.* What is the active principle, and what are the relative proportions of it in the root and flower? (See *Year-Book*, **1904,** 27.)

2. *Bay Berries.* An examination of the bitter principle of the pericarps of bay berries is required.

3. *Cascara Sagrada.* What is the nature of the various resins contained in the bark? The cascara sagrada of commerce apparently consists of two species, *R. purshiana* and *R. californica*, the latter having a much paler fracture. It is desirable to ascertain how far these differ in activity, percentage of active principles, yield of extract, etc. (See *Year-Book*, **1893,** 131; **1899,** 134.)

4. *Castor Oil.* A research having for its object the isolation of a purgative principle is required. (See *Year-Book*, **1898,** 163, 184; **1901,** 125. *Pharm. Journ.* [4], **5,** 84; **11,** 152.)

5. *Chamomile.* Research upon the bitter principle of *Anthemis nobilis.* (See *Bull. de Soc. Chim.* [2], **41,** 483; *Year-Book*, **1904,** 266.)

6. *Cimicifuga racemosa* (Actæa racemosa). Further information is needed on the chemical nature of the constituent or constituents to which the rhizome of the plant owes its activity. (See *Year-Book*, **1885,** 149.)

7. *Damiana* is reported to contain a bitter substance, resins, and volatile oil. The liquid extract of the leaves being ex-

tensively used, a thorough systematic examination of this drug is desirable.

8. *Determinations* of the total quantity of alkaloids in certain plants, such as belladonna, at *different stages of growth* would be useful.

9. *Euphorbia pilulifera.* Required, a report upon the chemistry of this drug.

10. *Fucus vesiculosus.* The medicinal virtues have been attributed solely to the presence of iodine and bromine. It is not improbable that it may contain some organic constituent of importance. A complete chemical investigation is required.

11. *Mezereon Bark.* What is the chemical nature of the acrid principle of this bark?

12. *Papaver rhœas.* An examination of the red colouring matter of the petals is required.

13. *Simarouba Bark.* A comparison of the constituents of this drug with those of quassia wood is desirable.

14. *Strophanthus.* Information is desirable on the best methods of separating the different active principles obtained from strophanthus seeds. (See *Year-Book*, **1898,** 54, 162; **1899,** 59; **1901,** 167; also *Pharm. Journ.* [4], **6,** 385, 506.)

15. *Taraxacum.* To what constituents are the cholagogue and diuretic properties due? To what extent do they vary in roots collected at different seasons of the year?

16. *Veratrine.* Should a pure veratrine be included in the British Pharmacopœia rather than the mixture of alkaloids now official? If so, suggest a process for its purification.

17. *Proximate Analyses* of the following drugs are required: *Cereus grandiflorus*, *Citrullus colocynthis*, *Cassia fistula* and *Serenoa serrulata* (Saw Palmetto).

Chemistry.

18. *Adeps.* A satisfactory test for the presence of cotton seed oil is needed. A good test for lard oil is required.

19. *Apomorphine.* Do solutions of this alkaloid retain their potency after coloration has taken place?

20. *Cinnamon Bark Oil.* The official physical and chemical tests are stated to be unsatisfactory. Investigation of authentic specimens of oil from bark and "chips" suggested. (See *Year-Book*, **1904,** 58.)

21. *Cotton Wools.* How far do commercial samples conform to the tests of the British Pharmacopœia?

22. *Ferri Arsenas.* The official tests supply only the means of determining the amount of ferrous iron present. It has been suggested that a method for the determination of the arsenic content should be ordered. (See *Pharm. Journ.* [4], **7,** 530; *Year-Book,* **1903,** 572.)

23. *Glycerin.* Required a good method for determining this substance, applicable if possible to pharmaceutical preparations.

24. *Ipecacuanha.* Experiments upon the method or methods for the separation of the alkaloids are needed.

25. *Sodium Arsenate.* A better method of assay than that now official would be welcome. (See *Year-Book,* **1904,** 166.)

26. *Tannins.* The various methods employed for the estimation of tannin in astringent drugs and preparations give very discrepant results. Required, a thorough research into the comparative result of these processes.

Pharmacopedy and Pharmacy.

27. *Botanical Sources* of the following require investigation. The varieties of asafetida and galbanum; the gum resin opoponax; the so-called Syrian tragacanth; the large liquorice root imported from Bussorah (probably *Glycyrrhiza echinata*), and the varieties of copaibas of commerce.

28. *Cannabis indica.* Preparations of uniform strength of this drug are needed. Experiments are required as to the best method of preparation. Experiments are also needed to determine the difference in yield of resin, cannabin, and cannabinol between the guaza of Bombay and the ganjah of Calcutta.

29. *Compressed Drugs and Coated Pills.* Required, a report on the strength and quality of the compressed drugs and coated pills of commerce.

30. *Effect of Cultivation, Soil, Climate, and Time of Collection on Medicinal Plants.* Compare the proportions of active constituents of indigenous plants grown in different districts, and the effect upon those constituents by variations in the time of collection.

31. *Ergot.* The determination of the proportion of active principles extracted from ergot by the official processes for the various preparations.

32. *Extractum Taraxaci Liquidum.* The specific gravity and proportion of solid residue appear to vary much in commercial specimens. To what is this variation due?

33. *Galenicals.* The action upon these of light and ordinary exposure in a pharmacy.

34. *Hamamelin.* Should this be prepared from the leaves or the bark? Experiments on the relative efficacy of powdered extractives from the two parts of the plant are desirable.

35. *Jaborandi.* The leaves as imported are much mixed with stalks. Should the leaves be completely separated from the stalks for the making of official preparations? What is the alkaloidal strength of old leaves, young leaves, and stalks?

36. *Liquor Sennae Concentratus.* In this preparation the senna is exhausted by repercolation; in the liquor for preparing syrupus sennæ, B.P., a process of double maceration is employed. Which is the better method?

37. *Liquorice.* An examination of commercial samples of "Block Juice" and "Stick Liquorice," with reference to their purity and glycyrrhizin content would be of value.

38. *Olive Oil.* It has been suggested that for galenical preparations purified cotton seed oil, arachis oil, or sesame oil might be substituted for olive oil. A series of plasters, liniments, ointments, etc., should be prepared with each of those oils, and the resulting products compared.

39. *Oxydase.* The action of this and other ferments in inducing changes in galenical preparations such as liquid extracts, etc.

40. *Pepsin.* A good method of assay—determining the peptonizing and not merely dissolving power of pepsin, suitable for inclusion in B.P., is wanted. (See *Pharm. Journ.* [4], **5,** 561; *Year-Book*, **1904,** 138; also Mette's test in Schäfer's *Physiology.*)

41. *Powdered Drugs.* The determination of the limits within which adulteration of powdered drugs can be determined under the microscope.

42. *Suppositories.* A compilation or determination of the specific gravity of the medicaments more commonly prescribed in suppositories in order that correct allowance may be made for the volume of the same. (See *Pharm. Journ.* [4], **5,** 437; [4], **6,** 69.)

TRANSACTIONS

OF THE

British Pharmaceutical Conference

AT THE

FORTY-FIRST ANNUAL MEETING

IN

SHEFFIELD,

1904.

CONTENTS.

Constitution and Rules of the Conference.

Alphabetical List of Members' Names and Addresses.

Programme of Transactions of the Conference in Sheffield, including Titles of Papers.

The Transactions of the Conference, including the Papers read and Discussions thereon.

Tables of Useful Information for Pharmacists.

General Index to the Year-Book and Transactions.

British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following :—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.
2. The subscription shall be 7*s.* 6*d.* annually, which shall be due in advance upon July 1.
3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.
4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.
5. The Officers of the Conference shall be a President, a number of Vice-presidents not exceeding six, by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.
6. At each Conference it shall be determined at what place and time to hold that of the next year.
7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.
8. The Executive Committee shall present a report of proceedings annually.
9. These rules shall not be altered except at an annual meeting of the members.
10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

*** *Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.*

FORM OF NOMINATION.

I Nominate

(*Name*) .....

Address) .....

as a Member of the British Pharmaceutical Conference.

Member

Date .....

This or any similar form must be filled up legibly, and forwarded to *The Asst. Secretary, Brit. Pharm. Conf.*, 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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NOTICE.

Members are requested to report any inaccuracies in these lists by letter, addressed as follows:—

THE ASST. SECRETARY,
BRIT. PHARM. CONF.,
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PRESENTATION COPIES OF THE YEAR-BOOK OF PHARMACY ARE FORWARDED TO THE FOLLOWING :—

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Bristol Pharmaceutical Association ; Dover Chemists' Association ; Forfarshire and District Chemists' Association ; Glasgow and West of Scotland Pharmaceutical Association ; Grimsby and District Chemists' and Druggists' Association ; Leeds Chemists' Association ; Liverpool Chemists' Association ; Manchester Chemists and Druggists' Association ; Midland Pharmaceutical Association ; Nottingham and Notts Chemists' Association ; Sheffield Pharmaceutical and Chemical Association ; Sunderland Chemists' Association.

Journals.

American Journal of Pharmacy ; Apotheker Zeitung ; Annales de Chimie Analytique ; Archiv der Pharmazie ; Board of Trade Journal ; British and Colonial Druggist ; Canadian Pharmaceutical Journal ; Chemical News ; Chemist and Druggist ; Journal de Pharmacie et de Chimie ; Medical Press and Circular ; National Druggist ; Pharmaceutical Journal ; Pharmaceutische Centralhalle ; Répertoire de Pharmacie ; Pharmaceutisch Weekblad (Amsterdam) ; L'Union pharmaceutique ; Zeitschrift des allgem. oesterreich. Apotheker-Vereines.

THE FOLLOWING PUBLICATIONS ARE RECEIVED FROM THEIR RESPECTIVE EDITORS :—

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PROGRAMME OF THE PROCEEDINGS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-FIRST ANNUAL MEETING, SHEFFIELD, 1904.

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WILSON, K. J.
WORRALL, J. H.
WRIGHT, R.

* *Local Executive Committee.*

THE SITTINGS OF THE CONFERENCE WERE HELD IN

THE LECTURE HALL OF UNIVERSITY COLLEGE, SHEFFIELD,

ON TUESDAY & WEDNESDAY, AUG. 9 AND 10, 1904,

Commencing at Ten a.m. each day.

TUESDAY, AUGUST 9.

The CONFERENCE met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m., adjourning at 4.30 p.m.

Order of Business.

Address of Welcome by the Principal of University College, Sheffield, Dr. HICKS, F.R.S.

President's Address.

Reception of Delegates.

Report of Executive Committee.

Financial Statement.

Report of the Treasurer of "Bell and Hills" Library Fund.

Report of Formulary Committee.

Discussion upon an arrangement between the Council of the Pharmaceutical Society of Great Britain and the British Pharmaceutical Conference concerning the B.P.C. Formulary.

Reading of Papers and Discussions thereon.

PAPERS.

1. *Note on Standardised Powdered Alcoholic Extracts: No. 1. Extract of Hyoscyamus*, by E. H. FARR and R. WRIGHT.
2. *Note on the Colouring Matters of Rosa Gallica*, by W. A. H. NAYLOR, F.I.C., and E. J. CHAPPEL.

WEDNESDAY, AUGUST 10.

The CONFERENCE met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m., adjourning at 4 p.m.

Order of Business.

PAPERS.

3. *Calumba Infusion and Concentrated Solution*, by F. H. ALCOCK, F.I.C.,
4. *The Determination of Boric Acid in Cider, Fruits, etc.*, by ALFRED H. ALLEN and ARNOLD R. TANKARD.
5. *Notes on Radio-Activity*, by W. HARRISON MARTINDALE, Ph.D.
6. *A Simple Mode of Preparing Synthetic Populin*, by LEONARD DOBBIN, Ph.D., and ALEX. D. WHITE, D.Sc.

7. *A Liquid Form of Linimentum Potassii Iodidi cum Sapone*, by H. William Jones, F.C.S.
8. *The Distribution of Fat and Strychnine in Nux Vomica Seeds*, by H. Wippell Gadd, F.C.S., and Sydney C. Gadd.
9. *Compressed Tablets*, by Henry Rodwell.
10. *A Correction Scale for the Dimmock-Branson Uric Acid Process* by F. W. Branson, F.I.C.
11. *Chemical Examination of Gymnema Leaves*, by F. B. Power, Ph.D., and Frank Tutin.
12. *The Chemical and Physiological Assay of Digitalis Tinctures*, by George Barger, M.A., D.Sc., and W. Vernon Shaw, M.A., M.D.
13. *The Cultivation of Valerian Rhizome in Derbyshire*, by F. A. Upsher Smith.
14. *Desiderata in a future Pharmacopœia*, by F. C. J. Bird.
15. *Report upon the Results of Examination of Pharmaceutical Preparations by the Analysts of the Poor Law Unions of Ireland for two years ending March* 31, 1904, by J. E. Brunker, M.A.
16. *Preliminary Notes on Sanseviera Thyrsiflora*, by Frederick Davis.

GENERAL BUSINESS.

Presentation from the "Bell and Hills" Fund.
Presentation to Mr. Francis Ransom, the late Honorary Secretary.
Place of Meeting for 1905.
Election of Officers for 1904–1905.

THURSDAY, AUGUST 11.

Excursion into Derbyshire, visiting Baslow, Chatsworth, Haddon Hall, and Bakewell. For particulars see page 590.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT SHEFFIELD, 1904.

The undermentioned visitors signed the Attendance book :—

Aberdeen—Giles, W. ; Kay, J. P.

Arbroath—Robertson, John ; Robertson, J. W.

Atherston—Parkinson, F. W.

Bedlington—Foggan, Mr. and Mrs. Geo.

Belfast—Nicholl, J. W.

Birmingham—Alcock, Mr. and Mrs. F. H. ; Gerrard, A. W., Hull, J. W. ; Perry, G. E. ; Poole, J.

Bournemouth—Keene, Harold.

Bradford—Hanson, A.

Brighton—Blamey, Mr. and Mrs. C. A. ; Gibson, W. H. ; and Miss Gibson ; Savage, Mr. and Mrs. W. W. ; Savage, B. A. ; Yates, C. G.

Bristol—Boorne, H. E.

Buxton—Wright, R.

Cambridge—Peck, E. Saville.

Chatham—Cook, Harry.

Cheltenham—Barron, W.

Chesterfield—Brinson, Mr. and Mrs. W. ; Brinson, Miss Ruby ; Smith, F. A. Upsher.

Coventry—Jones, H. W.

Dalkey—Beggs, Mr. and Mrs. G. D.

Doncaster—Stiles, M. H.

Dublin—Conyngham, Mr. and Mrs. Henry ; Grimes, H. C. ; Lawson, John ; Wells, Mr. and Mrs. W. F.

Dundee—Anderson, Mr. and Mrs. A. B. ; Russell, Mr. and Mrs. James.

Edinburgh—Duncan, W. ; Gibson, Adam, and Miss Gibson ; Hill, J. Rutherford ; Rowland, G. H. C.

Exeter—Gadd, H. Wippell ; Vinden, Mr. and Mrs. F. W. ; Vinden, H. F.

Glasgow—Brodie, R.; Currie, Mr. and Mrs. W. L.; Lothian, J.; Reid, Miss; Robertson, Mr. and Mrs. G.

Gravesend—Clarke, R. Feaver.

Grimsby—Colley, H. W.

Haddington—Wilson, W. P.

Hawick—Kennedy, D.

Hebburn-on-Tyne—Gray, M. E.

Hitchin—Ashton, F. W.; Ransom, Mr. and Mrs. F.

Ilkley—Worfolk, Mr. and Mrs. G. W.

Leamington—Bates, J.

Leeds—Beacock, J. H.; Preston, Thos. I.; Sargeant, F. Pilkington.

Liverpool—Evans, Edward, Jr.; Evans, J. Herbert; Lenton, W. H.; Shacklady, J.; Symes, C.

London—Allen, K. C.; Ball, A. W.; Bird, F. C. J.; Bourdas, Isaiah; Bourdas, Miss Alice; Bowen, J. W.; Bremridge, R.; Brewis, E. Theodore; Cresswell, F.; Daniel, E.; Francis, Mr. and Mrs. Alan; Frost, S. T.; Glyn-Jones, Mr. and Mrs. W. S.; Hearn, J.; Humphrey, Mr. and Mrs. John; Howie, W. L.; Idris, Mr. and Mrs. T. H. W.; Idris, H.; Idris, W. H. W.; Idris, Emmeline, Miss; Maben, T.; MacEwan, Peter; Martindale, Dr. and Mrs. W. H.; Matthews, W.; Naylor, W. A. H.; Robinson, R. A.; Robinson, Miss; Smith, J. H.; Smith, J. G.; Solomon, A. H.; Taubman, R.; Thomson, Miss; Tyrer, Thos.; Umney, Mr. and Mrs. John C.; Want, W. P.; Weld, C. C.; White, Mr. and Mrs. Edmund; Will, W. Watson; Woolley, S. W.

Manchester—Clementi, Miss; Grier, Jas.; Johnstone, C. A.; Kemp, Harry; Kirkby, W.; Lawton, Mrs., Pidd, A. J.; Pidd, Miss; Smiley, J. A. R.; Wild, Mr. and Mrs. John.

Newcastle—Clague, T. Maltby; Martin, N. H.

Newport—Russell, Miss.

Nottingham—Eberlin, A.; Middleton, A.; Parkes, G. J. R.; Parkes, Mrs. and Miss.

Peebles—Lindsay, Mr. and Mrs.

Peterhead—Tocher, J. F.

Plymouth—Barge, J.; Turney, J. Davy.

Settle—Shepherd, Mr. and Mrs. J. W.; Shepherd, W.

Sheffield—Antcliffe, Mr. and Mrs. H.; Austen, Mr. and Mrs. John; Barclay, W.; Blow, Miss; Carr, Percy; Cooper, W. M.; Eardley, J. P.; Eardley, Mrs. and Miss; Ellinor, G.; Fox, A. Russel, and Miss; Hill, Mrs. L.; Jackson, J. Gilbert; Jackson,

F. Gilbert; Newsholme, G. T. W., Mr. and Mrs., and the Misses Newsholme (3); Owen, G.; Pater, Mr. and Mrs. J. B.; Percival, Tom; Preston, Job; Robinson, A.; Squire, Mr. and Mrs. G.; Tankard, A. R.; Williams, H. G., and Miss G. Williams; Williams, Mrs. L.; Wolstenholme, W.; Worrall, J. H.

Shrewsbury—Cross, W. Gowen.

Stockbridge—Marsden, Mr. and Mrs. Chas. E.

Tunbridge Wells—Hobbs, Mr. and Mrs. A. E.

Whaley Bridge—Hall, Mrs. Edward; Little, Miss.

Wakefield—Chaplin, J. H.

Warrington—Young, Mr. and Mrs. J. Rymer.

GENERAL MEETING.

Tuesday, August 9, 1904.

The opening session of the Conference was held at the University College on Tuesday morning, August 9, 1904, the President (Mr. T. H. W. Idris) occupying the chair. It was expected that an address of welcome would be delivered by Dr. Hicks, F.R.S. (Principal of the College), but Mr. G. T. W. Newsholme (President of the Local Committee) performed the duty, the Principal being away on a holiday.

Mr. NEWSHOLME said: I regret to have to say that Dr. Hicks, the Principal of the Sheffield University College, is unable to be with us this morning. Those of us who know Sheffield know that Dr. Hicks at the present time is an exceedingly busy man. You are all aware that we are doing our best to get in Sheffield a Sheffield University. At present this is only Sheffield University College. I mention that fact because Dr. Hicks, who has been working extremely hard during the past few months, in fact during the last few years, is taking a very brief holiday on the Norfolk Broads. He could not be away very long, and although he would have willingly come back to welcome the Conference, it would have been rather too much, as it would have meant taking out of his brief holiday something like three days. Therefore I am quite sure you will excuse Dr. Hicks for not being present this morning. In the absence of Dr. Hicks, my colleagues, the Local Executive of the Pharmaceutical Conference, have been good enough to ask me to give a welcome on behalf

of the chemists of Sheffield to the Conference. The Lord Mayor of Sheffield last night gave you a very hearty welcome on behalf of the citizens of Sheffield. Therefore it is unnecessary on my part to say anything more on broad grounds, and I will confine myself to the question of chemists being received by chemists. I am here on behalf of the pharmacists of Sheffield to give you a very hearty welcome. Twenty-five years ago—time passes so very quickly that it seems but a few years ago —the Conference visited Sheffield. Great things have happened since then. Sheffield has progressed enormously, with its wider streets and its much broader spirit, if I may say so, affecting every branch of society. I am not sure that we pharmacists have progressed quite as much as we could have desired in that time, but I think we have got on fairly well. We have managed to exist at any rate, and that is a great deal at the present time. I am sure that the visit of the Conference twenty-five years ago had a great deal to do with creating a better feeling amongst local pharmacists. I think that visit created a new life amongst local pharmacists, which has been maintained to this day. Therefore we look forward to the visit of the Conference to renew old acquaintances. I trust that last night we were able, in our beautiful Town Hall, to renew some old friendships, and to cement them anew. We give you a very hearty welcome ; we do not want it to be wholly a spoken one ; we want to show you in the next few days what our welcome means. I hope that what we shall do in the next few days, in the way of showing you some of Sheffield's works and some of our beautiful country, will interest you immensely.

The PRESIDENT : I desire to move that you accord a very hearty vote of thanks to our genial and respected friend Mr. Newsholme, for his hearty welcome here to-day. Of course, we deplore the absence of Dr. Hicks, but when the reason of his absence has been explained by Mr. Newsholme you will all join in heartily wishing the realization of his scheme for a University for Sheffield. All of us who had the pleasure of being here twenty-five years ago remember what a hearty Yorkshire welcome we had then. We remember very many pleasant things indeed, and we have also some sad memories. We look forward to the cementing of the friendships made then, or many of them, and to the making of new ones. Were I to continue indefinitely I could not say more than that we very heartily thank Mr. Newsholme for his welcome, and especially after the taste of the hearti-

ness of the welcome that we had from the Lord Mayor of Sheffield yesterday.

Mr. N. H. Martin, in seconding, said: We also thank Principal Hicks for his kindness in intending to be here to-day. He is very ably represented by Mr. Newsholme, who has voiced his welcome in an admirable manner. I am rather disappointed, because I had for many years the privilege of knowing Dr. Hicks personally, and I congratulate Sheffield very much indeed that its great scheme for the formation of a University is in the hands of such an energetic and able man as Dr. Hicks. I hope his holiday will give him health and strength, and that he will come back to carry that scheme to full fruition in a manner which will be satisfactory to the whole community. We heartily reciprocate all the kind things which have been said to the Conference. We have had Yorkshire welcomes in other parts of the country. I believe now we are absolutely in the hub, and the warmth of the welcome will correspond with the heat of the centre.

The resolution was carried unanimously

PRESIDENTIAL ADDRESS.

A YEAR'S PROGRESS IN PHARMACY.

By T. H. W. Idris, J.P., L.C.C., F.C.S.

The Incubation of the Conference.

Great is the honour, great the responsibility, of addressing you to-day, when the Conference, returning to Sheffield after the lapse of a quarter of a century, holds the forty-first of its annual meetings.

That in the encouragement of pharmaceutical research and the promotion of friendly intercourse amongst pharmacists the Conference has fully maintained the objects for which it was formed is generally recognized, and the splendid record of the admirable work carried on under its inaugurating and stimulating influence is ample excuse for me in momentarily dwelling on that most interesting part of the Conference's history—the period of its incubation. Particularly apropos is this when we recall the fact that it was at our last meeting in Sheffield that the veteran to whose early labours the Conference is measurably

indebted, Dr. John Attfield, founder and one of the first two Honorary Secretaries of the Conference, tendered his resignation after sixteen years' service. The change thus involved was considered so serious by the Committee that at their urgent request Professor Attfield consented to continue the duties for another year. It would appear that the idea of holding annual provincial gatherings of pharmacists from all parts of the country was first suggested by the late Mr. G. F. Schacht, in September, 1852. Later, in May, 1863, Mr. Richard Reynolds saw in the occasion of the meeting of the British Association at Newcastle in August of that year an opportunity for a conference of pharmacists with a view to promoting systematic scientific inquiry. Mr. Reynolds found a supporter in Mr. Henry B. Brady, and Mr. G. F. Schacht referred in the correspondence which followed to his earlier suggestion that the annual meeting of the Pharmaceutical Society should be held not always in one fixed place, but in rotation at the various towns of importance where its members resided.

So far as the peripatetic annual meeting of the Pharmaceutical Society was concerned, Mr. Schacht's views were not generally accepted, but 1863 witnessed a large body of opinion favourable to the holding of an annual assembly of pharmacists. From the moment Dr. Attfield joined Messrs. Reynolds and Brady in initiating such meetings the Conference proved a success. Resulting from a circular issued by these gentlemen on July 21, 1863, fifty prominent pharmacists gave cordial support to the scheme, and the B.P.C. was founded at Newcastle-on-Tyne on September 2, 1863. Professor Bentley's resolution proposing an annual conference was seconded by Professor Attfield.

An exceedingly interesting letter from Dr. Attfield, giving some particulars of the formation of the Conference, was read at last year's meeting at Bristol. The last paragraph of that letter read as follows :—

" Personally, I much regret to be absent from the gathering, but at the time, and for a few weeks afterwards, I shall be in the hands of a well-known surgeon, who promises such results as will enable me to attend meetings of the Conference for years to come."

His numerous friends were soon afterwards able to congratulate him on a most complete restoration to health and strength. We greatly regret, however, that his hopes, as expressed in the paragraph which I have quoted, have been doomed to dis-

appointment, as his medical advisers prohibit his return for the present.

In a letter to me he says :—

"Alas! the keen delight with which I have been looking forward to being present at the approaching Conference at Sheffield, to supporting you, perhaps to saying a word of appreciation of the long and valuable services of Mr. Ransom, and generally to taking part in the business and pleasures of the gathering, must suffer disappointment. I need only refer you to the enclosed copies of letters from my medical advisers."

Still, we have every reason to believe that his indisposition is only of a temporary character, and to hope that we shall soon have the pleasure of seeing him amongst us again.

Obituary.

The circular to which I have referred initiating the Conference had the support of William Bastick and B. S. Proctor, whose names I single out because they are those of two gentlemen who have passed away since we met last year. Bastick, in his day, was an ardent pharmaceutical reformer, and no one ranked higher as a practical pharmacist than Proctor. The losses which the Conference and pharmacy have sustained since our last meeting also include: Mr. John Barclay, B.Sc., of Birmingham; Mr. James Maurice, of Plymouth; Mr. J. H. Mathews (Hon. Sec. to the 1900 London Local Committee); Mr. John McMillan, of Glasgow; Mr. A. R. Bennet, of Nottingham; Mr. W. Ward, of Sheffield; Mr. Thos. Whiffen, and Mr. Elias Bremridge, the honoured and venerable ex-Secretary and Registrar of the Pharmaceutical Society.

It is, as I have said, twenty-five years since the Conference met in this city, and then it was under the presidency of a pharmacist whose keen interest in the formation of the Conference I have indicated—the late Mr. Schacht. For reminiscences of the last Sheffield Conference we must look to Mr. Newsholme, the Treasurer of the 1879 Local Committee, and afterwards the remarkably popular President of the Pharmaceutical Society. The pleasurable anticipations of a great many members in connection with this second visit to Sheffield are greatly enhanced by the pleasure of meeting Mr. Newsholme. There are, of course, several others who took an active part in the arrangements, but the President of that Committee, Mr.

William Ward, unfortunately was removed by death in January last.

We deeply regret that another eminent member of the Conference and resident of Sheffield, Mr. Alfred H. Allen, has just been removed by death. His genial and cheerful presence will be greatly missed. His labours in connection with the Conference were most valuable. From 1871 to 1896 he read no less than fifteen papers before the Conference, and these papers were of a most important and practical character. He contributed about 200 to other scientific societies, and in his great work on *Commercial Organic Analysis* we have a most valuable heritage.

As pharmacists we ought to express our gratitude to one of the most eminent members of the medical profession in this country, Sir John Simon, F.R.S., who has just passed away. The memory of his great services to pharmacy will not readily fade.

The B.P.C. Formulary.

I wish, in the next place, to call your attention to a suggested change of great importance to the Conference, for this year may see the finish of the work of the Unofficial Formulary Committee, which has now been in existence for upwards of eighteen years. I think I should be failing in my duty as the present President of the Conference not to make some reference to the work of that Committee: it has been of very great value to pharmacy, and has at all times been carried out, by those pharmacists who have constituted the Committee, as a labour of love, and without any monetary recompense. It is interesting to recall that what appears to be the first suggestion for the publication of such a book was made by Dr. Symes in a paper read by him at the meeting in Swansea in 1880. The formation of an Unofficial Formulary Committee was proposed by the late Mr. Richard Reynolds at the meeting of the Conference in 1886, at Birmingham, who referred to the similar work that had been undertaken for some years by the Pharmaceutical Society of Paris, and I think there is no question that that Committee has carried out faithfully the work indicated in the resolution which he moved, which was :—

"That, in order to secure greater uniformity in composition and strength in non-official remedies, and also to enable the medical profession to prescribe them with definite knowledge of

those qualities, and without indicating any particular maker, the Conference undertakes the preparation of a formulary of non-official remedies."

The motion was seconded by Mr. S. R. Atkins, the greatly respected ex-President of the Pharmaceutical Society, who, to our great regret, is unable to be present at this meeting. There was considerable need for such a publication as was suggested. Many years elapsed between the publication of the respective British Pharmacopœias, and at that time there was a tendency to introduce new vegetable drugs which, during their period of probation, came to be prescribed by medical men. Uniformity of the preparation of such drugs thus became desirable. It is with considerable apprehension that one notices to-day that the introduction of new vegetable products is extremely rare, and that the whole tendency of new remedies is in the direction of synthetic chemicals, mostly produced, in consequence of fiscal conditions, in other countries than our own.

At the meeting to which I have referred the very practical resolution of Mr. Reynolds was supported by such able pharmacists as the seconder, Mr. Atkins, Dr. Symes, and the late William Martindale, and one cannot help admiring the unselfishness of the last-named, who, although he recognized in this work a serious competitor to his own book, yet endorsed the value of the suggestion, and allowed himself to be appointed as Chairman of the Committee. Since the death of Mr. Martindale, Mr. Martin has rendered valuable service as Chairman of that Committee. The remarks made by the leading pharmacists in this country, and by a past-President of this Conference, now unfortunately deceased -Mr. Schacht—show plainly that there was a difference of opinion even at that time among the leading pharmacists as to the proper body to compile such a work as an Unofficial Formulary. While Mr. Schacht evidently held the opinion that such a work should be issued by the Pharmaceutical Society, Mr. Martindale thought that, in consequence of the relations of the Pharmaceutical Society with the General Medical Council, it would be better that the Conference should undertake such a work, being naturally quite unfettered in its action. This difference of opinion may, to a certain extent, be held to have existed up to the present time, and it is because the Council of the Pharmaceutical Society has now decided to issue a "Compendium of Medicines," which will cover a considerable part of the ground formerly traversed by the Formulary

Committee, that it has been suggested that the labours of this Committee shall cease and its work be absorbed by the parent Society.

The publication of the Formulary has led to good-fellowship and united work, and one has only to go through the list of names of those who have given their services to this Committee to see that it has been carried out by the leading pharmacists of this country. Not only that, but a considerable part of the British Pharmacopœia Addendum of 1890 included the results of the labours of the Committee, and one sees also in the pages of that work and of the Pharmacopœia of 1898 the names of the same pharmacists who have taken part in this important work for the benefit of pharmacy. Although it was at first anticipated that the Formulary might be an expense to the Conference, and, indeed, was opposed on that ground by some, who thought that the parent Society could better afford it, it has been a source of income to the Conference rather than an expense. As many as 2,250 copies of the Unofficial Formulary were sold in the first twelve months, and a very creditable profit has annually resulted from the sale of that work.

It is on that account, doubtless, that the Council of the Pharmaceutical Society, in modifying the scope of the proposed *Compendium of Medicines*, has had in mind that a monetary injustice might be done to the Conference by the absorption of the published formulæ and unpublished work, and it is gratifying that a recompense has been suggested in the form of an honorarium of seventy guineas, to be paid to the funds of the Conference by the Pharmaceutical Society. An opportunity will doubtless be given at this meeting later for discussing the subject: but I venture to hope that you will recognize that I, as your President, have acted as far as possible in the interests of pharmacy in this matter, in conjunction with my friend, Mr. R. A. Robinson, the President of the Pharmaceutical Society. The Council's Compendium Committee and our own Executive Committee have also done their best to arrange a compromise satisfactory to all parties, and one ensuring all loyalty to the parent Society, and, if it be desired, the continued individual help of those who have contributed so much to pharmacy by their labours in connection with the Formulary Committee. In the light of the proposed publication of the Compendium by the Pharmaceutical Society, the discussions on Dr. Symes' paper in 1880 and on Mr. Reynolds' motion in 1886 are very interesting, and

I feel sure that you will all join with me in expressing the hope that the Compendium will realize all the hopes of its projectors, and that it will prove of great service to the prescriber and dispenser of medicines.

I feel in the first place that an apology is due to the Conference in that I present no record of the progress of pharmacy during the year. I have, however, felt the necessity of enlarging on the main features of my address of last year in view of its immense importance to the public and to the pharmaceutical calling, being assured that in our *Year-Book* and the papers to be read at this meeting we have an adequate indication of the advances that have been made in pharmaceutical research. Turning briefly, however, to recent advances in the

Chemistry of Essential Oils,

a branch in which I am naturally interested, there are two aspects of the subject to which I may just devote a few words. Recent endeavours have been, to a large extent, directed to the production of synthetic bodies properly so called, and of artificially made mixtures improperly called synthetics. In the first place, no one can seriously deny that the exact balancing of odours manufactured in Nature's laboratory is in general considerably superior to that turned out by art. But there is a tendency—due to ignorance and prejudice—to regard this as due to some inherent quality in natural products which is not present in artificial products. That, of course, is not so at all. Given chemically pure vanillin, for example, there cannot be the faintest difference between samples of natural or artificial origin. If the natural body be contaminated with traces of some other compound, derived from the same natural source, it may truly be superior to pure vanillin—and herein lies the whole explanation of the general superiority of natural over artificial products. Artificial compounds reach, as a rule, a very high standard of chemical purity: the natural products contain traces of bodies which mellow and round off the odour to its best advantage. Let us look at such a body as otto of rose. There is a so-called —but wrongly called—synthetic otto of rose on the market which, in the opinion of all connoisseurs, cannot in the least compare with natural otto. Is it to be wondered at? To get this so-called synthetic otto we mix geraniol, contaminated with other products from citronella oil, with an artificially prepared citronellol and a dash of phenyl-ethyl alcohol and a few

other bodies which are known to exist in natural otto. But after this mixture had been on the market for a year or two, a few perfumers having tried it, and still fewer having liked it, two German chemists a month or two ago discovered three new compounds in natural otto of rose. There are the alcohol nerol, the phenol eugenol, and a sesquiterpene alcohol, possibly identical with farnesol. And if these bodies can be obtained from other sources at a price which would allow their use, there is no doubt that other bodies, in small quantities, which have hitherto been overlooked, will again be found in natural otto. Many similar examples could be quoted, but I use this illustration merely to show that the synthetic can only equal the natural after years of careful work and gradual improvement, the natural bodies always starting with a good handicap in their favour. As an example of synthesis, properly so called, I may mention the recently published results of the work of Bouvealt and Gourmand, who, by treating ethyl geraniate with sodium, have obtained rhodinol, the characteristic alcohol of oil of roses. The announcement of the synthetic preparation of camphor in America was made so fully and circumstantially in the *Scientific American Supplement*, **1903,** that it excited great interest: but it was received with some surprise and a good deal of scepticism, which now appears to be justified. When the famine prices of a few months back were prevailing, one expected to see the American article on the market, but so far it still appears to be "*in nubibus*," and one hardly knows whether artificial camphor is or is not being manufactured.

A direction in which a considerable amount of work has again been going on this year is in the study of the influence of external conditions on the characters and composition of the essential oils yielded by plants. This work has mostly been carried on by Charabot and his pupils, and by Jeancard and Satie, but in the latter case the work has been only of a desultory nature as compared with Charabot's more exhaustive researches. The obvious results of such work, if any be achieved at all, must be in the direction of modifying for the better the characters of such natural products as essential oils. But I must confess—as I think I mentioned last year—that I am not convinced by the results published that sufficient has been done even to base the slightest generalization, such as the learned authors have allowed themselves to lay down. In regard to special work connected with this large subject, I feel I can only skim over the surface

and mention a few out of the many researches which have been brought to a successful conclusion this year. In regard to the adulteration question, to which I drew attention last year, I have made careful inquiries, and I am credibly informed that the very gross adulteration of several oils, such as peppermint and citronella oil, has greatly diminished. This is due very largely to the work of Parry, Umney, and Bennett, to whose numerous papers on those two oils I only draw attention. The adulteration of peppermint oil, which reached a maximum towards the end of 1903, has lately been falling off ; but sophisticated samples of American oil are still being offered on the London market. Parry and Bennett have recently published a summary of past work, and have separated another admixture, which they believe to be cedar wood oil. Oils which are not soluble in 70 per cent. alcohol, and have a low menthol content, cannot be passed as pure without full investigation and comparison with genuine samples. In a series of papers published in the *Chemist and Druggist*, Parry and Bennett took up a strong position as to the value of " Schimmel's test " for citronella oil, pointing out that many samples which were not pure passed the test, and that the latter was therefore not to be relied on. This was not at first accepted by Messrs. Schimmel and Co., but in their semi-annual report, published in April, 1904, they admit that Russian petroleum may be undetected up to 10 per cent. They have accordingly devised a test for citronella oil, which they called " the raised Schimmel test," which consists in adding 5 per cent. of Russian petroleum to the sample of oil and determining the solubility of the mixture in 80 per cent. alcohol. No separation should take place if the original oil is pure. The use of Schimmel's test alone is therefore acknowledged to be useless for detecting small proportions of adulterants.

Another English chemist, Spurge, has shown that the German method of determining eugenol in clove oil, elaborated by Thoms, is inaccurate, with the result that Thoms has agreed and modified his process accordingly. J. C. Umney confirms the statement that the specific gravity of English lavender oil increases with age, and notes that the last distillates, although containing a higher percentage of esters, have a decidedly pleasant odour. He points out that the separate collection of the last fraction is justifiable on this account, and that a specific gravity of 0·883 may be taken as a minimum limit for a pure English oil. His observations on the distinct influence

of the soil on the character of lavender oil are very interesting. Cajuput oil has been the subject of an article by J. C. Umney, who points out that the specific gravity and content are distinctly lower than those met with a few years ago, and suggests a lowering of the minimum specific gravity limit in the British Pharmacopœia to 0·919.

A protest against selling lemon oil guaranteed to contain 7 per cent. of citral has been published by Parry, and his opinion that lemon oil does not normally contain more than 3·5 to 4 per cent. has been supported by Burgess and Child, Chapman and others, and confirmed by manufacturers of terpeneless oil of lemon, who find it impossible to obtain more than 5 per cent. of flavouring constituents, of which only about one-half consists of citral. An exhaustive paper on the determination of aldehydes and ketones in essential oil by the neutral sulphite process was read by Herbert E. Burgess at the December meeting of the Society of Public Analysts (1903). Special details were given in the paper for the determination of citral in lemon oil: concordant and accurate results were also obtained in the case of carvone, cinnamic aldehyde, benzaldehyde, and in the analysis of caraway, cassia, cinnamon, spearmint, almond, lemongrass, cumin, pennyroyal, and many other oils containing aldehydes and ketones.

The physical constants of acetylated santal wood oils have been published by Parry and Bennett, and also the characters of various fractions of santal oil distilled under reduced pressure.

Parry and Bennett have found that samples of adulterated spike oils will pass the generally accepted solubility test, and propose to reduce the strength of alcohol used in the test from 70 per cent. to 65 per cent., in six volumes of which all pure oils are soluble. The experiments of Von Soden and Taffe appear to prove that the alcohol nerol is present in otto of rose to the extent of 5 to 10 per cent., and that it plays a most important part in the specific perfume of the otto. Hudson Cox and Simmons have determined the iodine absorption of several samples of pure and adulterated otto of rose, and propose a limit of 187 to 194 for pure oils. Geranium oil and other common adulterants give much higher figures, and it is stated that small proportions can thus easily be detected. Several new odorous bodies of interest have been discovered during the past year, amongst which farnesol, probably one of the most important, is a sesquiterpene alcohol isolated from the essential oil

of cassie flowers, and probably detected in otto of roses also. A new sesquiterpene, to which the name of limene has been given, has been discovered in oil of limes and in oil of lemons by Burgess and Page, and Chapman has isolated a light terpene closely resembling myrcene from oil of hops. Power and Lees have also isolated a new ketone, "umbellulone," from the oil of Californian laurel leaves.

Amongst those oils which have been very fully investigated I may mention pimento, in which many new bodies have been discovered, including cineol, phellandrene, methyl-eugenol, and palmitic acid; lavender oil, in which amyl alcohol and a new ketone have been discovered; patchouli oil, in which benzaldehyde, cinnamic aldehyde, a terpene alcohol, a new ketone, a new base, and several sesquiterpenes have been found; and laurel leaf oil, in which several fresh constituents have been discovered. There have, I am glad to say, been many other papers published by English chemists on this subject, and in this connection I may say a few words as to suggested alterations in the British Pharmacopœia in this group. All the new editions of other pharmacopœias which have recently appeared have made distinct progress in this department, and, considering the immense amount of adulteration in essential oils, the Pharmacopœia authorities ought certainly to see that the descriptions and methods of assay are correct and up to date. To mention only quite a few examples which require revision: Under oil of aniseed the congealing point is given as from 10° to 15°: when scientifically taken this figure is more often than not 15·5°, and just falls outside the B.P. limit. The specific gravity of cajuput oil is fixed too high: that of lavender oil might be slightly modified; otto of rose is described as being derived from *Rosa damascena*, but it is in fact always derived from this and a mixture of white roses in Bulgaria, and from a different rose altogether in some other places. The specific gravity of otto of roses, as given in the B.P., 0·856 to 0·860, is wrong; in most years the proper limits are 0·850 to 0·857, and an otto with a specific gravity 0·960 at 30° is, in nearly all seasons, certainly adulterated. Under balsam of copaiba the characters of oil of copaiba are quite erroneous; the figures for oil of lemon are such that no analyst dare rely on them; under santal wood oil the santalol content is not given, yet it is agreed by every authority in the world that it should be at least 90 per cent. I think that in the next edition the editors should boldly adopt the latest and

most scientific methods for testing these bodies as a means of assisting in reducing adulteration to its lowest limits. I might go on to great length on this subject, dealing with the numerous additions to its literature, but I have purposely only made allusions to the more important points, and now pass on.

The Metric System.

One of the latest developments in connection with the B.P. is the movement to make the metric system the one legal system in dispensing. It is significant that the columns of the medical journals a short time back were devoted to showing medical men how to write prescriptions in the metric system. We see the matter advanced a stage further by the resolution passed at the last meeting of the General Medical Council, as follows :—

"That the President (with the Chairman of the Pharmacopœia Committee) be requested to inform the Lord President of the Privy Council that, in the opinion of the Council, it is desirable that after a sufficient period, to be fixed by law, the metric system of weights and measures should become the one legal system for the preparation and dispensing of drugs and medicines ; that the Council would view with favour the passing into law of a Bill such as that now before Parliament entitled the Weights and Measures (Metric System) Bill ; and that in that event the Council would be prepared to take all necessary steps to give effect to the law by making the proper modifications in the British Pharmacopœia."

In order to minimize the inconvenience that must follow the enforcement of the metric system it behoves us all to make ourselves familiar with its details. In the drug trade there are gentlemen who have systematically endeavoured to infuse the principles of the scheme into their employés, and recently at the sports of a well-known pharmaceutical concern all the distances were arranged by the firm on the metric system. It is to be hoped that all quantities in the Pharmaceutical Society's proposed *Compendium of Medicines* will be given in terms of a decimal or metric system. Pharmacists must maintain their position in the vanguard of progress.

Pharmacy Legislation.

Although the introducer and supporters of the Pharmacy Bill have failed to obtain a hearing in the House of Commons this year, the present Session has been, as pointed out recently

by Mr. Pilkington Sargeant in *The Pharmaceutical Journal*, one of almost unprecedented activity amongst chemists, both individually and collectively. The necessity for more active co-operation in order to obtain a more drastic enforcement of the intention of the Pharmacy Act, 1868, has been more fully realised. A large number of members of Parliament, after acquainting themselves with the facts of the case, have expressed the opinion that the House of Lords decision in the London and Provincial Supply Association case was contrary to the original intention of Parliament, and that, being unjust, it was a perversion of law. They have also realised that the present state of the law is contrary to public policy. As you are aware, one of the chief objects of the Pharmacy Bill is to restore in some degree the principle of qualified ownership, to ensure that the sale of poisons and the dispensing of prescriptions should not be conducted otherwise than under the direct and absolute control of responsible men, whose experience and education had been guaranteed by examination. The chemist-servant of a company has not by any means a free hand. He may at times make a timid suggestion, but it is the director who controls the procedure. The opinion of the qualified servitor is generally neither sought nor welcomed when volunteered. The education of the financially responsible vendor or director is the only safe foundation for poison legislation. The recklessness and audacity with which the agitation against the Pharmacy Bill has been conducted, and the manner in which it has been fostered by a few prominent dealers in proprietary poisons, has forced on chemists the necessity of united effort, not only for the preservation of their own status, but also for the protection of the public and the guidance of legislators. As an illustration of the way in which the intentions of the Legislature were being frustrated, and the manner in which some of these companies, formed for the purpose of evading the law, discredited the legitimate chemist in the eyes of the public, I instanced at the dinner of the London Chemists' Association the case of a girl who had been employed for some time by a limited company to pack seidlitz powders, and to put up for sale other things in regular demand, and who recently formed a company in a town on the south coast, opened a "chemists'" shop, and adopted some very novel but rather questionable methods of selling drugs. One of these methods was to send out broadcast requests that clergymen should send in the names of sufferers from gout.

An honorarium of 20s. on all orders received from such recommendations or introductions was promised. The exposure of this little enterprise gave the Pharmaceutical Society an opportunity of pointing out in the lay Press that the company could not be classed as qualified chemists, and the matter was the subject of a letter to the *Times* by Sir Edward Fry.

In a trade journal, the *Chemist and Druggist*, of July 2, figures were given of companies connected with the drug trade, showing that the registration of such companies is going on at a rapidly increasing rate, and that journal goes on to remark: "Allowing for all these, we are within the mark in saying that 1,000 out of the 1,328 companies were formed by persons who are not chemists and druggists by examination; many of them have been grocers or similar storekeepers, and they have adopted the company principle in order to make themselves right according to the law as interpreted by the House of Lords in 1881." I have had taken out the particulars of all the companies registered with the object of carrying on the business, *inter alia*, of chemists and druggists during the year 1903, and although it is difficult to give proof it appears perfectly clear that by far the larger number of these were registered with small capital, with a clear intention of evading restrictions as to qualification, etc., imposed on "persons" in connection with carrying on business. The same remarks apply to retail drug companies registered in 1902 and 1901, which I have also had abstracted.

The opponents of the principle of qualified ownership have been very active in trying to impress members of the Legislature with the idea that the Pharmaceutical Society is inviting Parliament to create a monopoly for registered chemists. That the principle underlying the Society's proposals is in the public interest, instead of the interest of registered chemists, has been shown in an able letter addressed by Mr. W. Watson-Will, Secretary of the Federation of Local Pharmaceutical Associations, to members of the House of Commons. In this connection Mr. Watson-Will presented a copy of the remarks of the Lord Chancellor, when withdrawing from the Companies Bill of 1899 a clause dealing with the question of company pharmacy. These observations of the Earl of Halsbury, quoted from Hansard, were :—

"My Lords,—There are one or two observations which, I think, it is desirable I should make to your Lordships. There were some clauses introduced in the Bill in Committee having

relation to questions which I think are very interesting to medical men and pharmaceutical chemists. I have received a very large number of communications upon the subject; and I am fully alive to the necessity of guarding very carefully the language by which the intentions of the measure, as manifested by the amended form of the Bill, should be carried out. I am still very strongly convinced that a company ought not to be permitted to do what a private person is prohibited from doing, and that the public must be protected from practices of that sort. It is impossible to resist the propriety of subjecting those companies who are at present carrying on businesses as chemists and druggists to restrictions such as are proposed in the Bill. I dare say you Lordships will remember that cases have decided —and, in my opinion, rightly decided—that the language which calls upon a person to qualify in any of the professions does not in turn apply to companies, and that the word "person" in the Acts which form the code upon the subject must be constructed as meaning a natural person, and not a company. The idea of an ideal personage, such as a company, practising and undergoing an examination is absurd, and cannot cohere with the language of the Statute. In my view, the learned judges who came to the conclusion that that was the true construction of the Statutes were perfectly right, and that decision left the law that a company could be formed to do the very thing which an individual is not permitted to do without examination as to qualifications. I think I may say that the Committee to whom this matter was referred were unanimously of opinion that the formation of companies to practise any profession, and which intended really to take advantage of company machinery to do that which an individual without qualifications may not do, should be stopped. As I have said, I have received a large bulk of correspondence on the subject, and in some of the communications which have been sent to me it is suggested that this is an effort to prevent proper enterprise, and so forth. As a matter of fact, I think, the writers were not familiar with the state of the law. It is true to say that, although a company cannot be prosecuted for doing it, and a company cannot undergo an examination to enable them to do it, yet if an individual dispenses without qualification you can catch him and prosecute. And it was in view of the state of the law on the subject that the Committee to which this matter was referred came to their conclusion. I must say that I quite agree that, if this matter is

to come forward, as it probably will in another session, it is desirable that we should guard very carefully the language used, so as not to interfere with any proper vested interest; but, on the other hand, we should not allow the public generally to be exposed to the dangers of the practising of unqualified persons as dispensers. What I said on a former occasion, that the Committee were practically unanimous, appears to have given rise to controversy. I say so still. It is true there were certain divisions on matters of detail during the investigations, which lasted three years—some members of the Committee went one way and some the other—but they were not important questions. What I said before, and what I adhere to now, was that on the main lines of the Bill—the important matters under the Bill—the measure, as now presented, represents the practically unanimous decision of the Committee. I think, my Lords, that it is a subject of congratulation that on such a subject practical unanimity has been attained. At this period of the session, I think, it is perhaps not worth while that I should go through the whole clauses of the Bill. I have said all that is necessary on the Report of Amendments to the Bill. I can only add that I believe the Bill will be a very great improvement on the state of the law as it exists at present, and that it will in a great measure check the creation of fraudulent companies, which, I think, is the proper thing to do, and not enact a penal code against persons engaged in the conduct of such enterprises."

Of importance in this connexion is the recent Ordinance of the Orange River Colony prohibiting a firm, co-partnership, or company from dealing in poisons or compounding prescriptions unless the business be managed by one or more partners or directors all of whom are registered chemists, sleeping partners or directors not being deemed to manage a business. We know from the mouth of the Prime Minister that this ordinance has been under the consideration of heads of departments in connection with the proposed Government Bill amending the Pharmacy Act. There is great significance in the approval of this Ordinance, communicated to the Secretary of State by the General Medical Council through its Executive Committee.

The draft Ordinance, which has still more recently been introduced into the Legislative Council of the Transvaal, provides not only for the qualification of all the directors of a limited company carrying on the business of a chemist, for the manage-

ment of every place of business owned by a company, by a qualified person whose name must be conspicuously posted in such shop, and for the full protection of titles; but also for the establishment of a Pharmacy Board to have charge of pharmaceutical matters, with disciplinary powers to erase from the register persons guilty of improper conduct.

As having an important bearing on this matter, I may quote the General Medical Council's important action at its last session in regard to professional companies, when it was resolved on the motion of Sir Chas. Ball, seconded by Mr. Tichborne :—

1. That copies of the judgments in the cases "O'Duffy *v.* Jaffe, Surgeon Dentists, Limited," and "The King (Rowell) *v.* Registrar of Joint Stock Companies," together with the following resolutions of the General Medical Council, be sent to the Lord President of the Privy Council for his information.

2. That, in view of the judgment of Chief Baron Palles, the General Medical Council hope that the Government will take such steps as may be necessary—(*a*) to restrain the Registrar of Joint Stock Companies from registering any new company unlawfully using the term dentist, or any similar title which would be likely to lead the public to believe that the members of such company were registered dentists when such is not the case; (*b*) to prevent companies already registered from continuing unlawfully to use the term dentist or any similar title which would be likely to lead the public to believe that the members of such company were registered dentists when such is not the case; (*c*) to in like manner prevent the use by companies of unlawful titles which would be likely to lead the public to believe that the members of such companies were registered medical practitioners when such is not the case.

The cases specified above Sir John Batty Tuke has since moved in Parliament for a return showing the number and names of companies registered to carry on dental and medical practice—have a direct bearing on the movement of the Pharmaceutical Society. O'Duffy *v.* Jaffe, Surgeon Dentists, Limited, was an action brought on behalf of the Irish branch of the British Dental Association against Marcus L. Jaffe and Jaffe, Surgeon Dentists, Limited, registered under the Companies Act, and carrying on business at Limerick. Marcus Jaffe was a director of the company. They were summoned for that they carried on dental operations although not registered under Section 3 of the Dentists Act, 1878, and that they had no right to use the titles

which they had adopted. It was contended for the prosecution that the company was formed to evade the Act ; for the defence, that neither the company nor the individual director was liable. The magistrates dismissed the summons, holding that the defendants were not liable under the Dentists Act, and the King's Bench Division, Dublin, upheld the view of the magistrates. The Lord Chief Baron was of opinion that the word " person " in Section 3 was confined to natural persons. His lordship even quoted observations by Lord Blackburn and Lord Selborne in the pharmacy case in support of his decision. And, turning to the actual wording of Section 3, which read, " Any person who not being registered under this Act takes or uses any such name, title, addition, or description," he said that referred to a natural person, who had his own name, and added to it another name or description, but did not include a company, which added nothing to its name. The High Court decision in this case places dentists on exactly the same footing as chemists with regard to their titles, and to this extent it may, in the long run, turn out advantageously to the craft as augmenting the forces arrayed against company exploitation of professional and semi-professional callings.

In the case of S. G. Rowell, Dentist, Limited, the Registrar of Joint Stock Companies had refused to register a company under that name, and the King's Bench Court, Dublin, on an application for a mandamus to compel registration, unanimously upheld the refusal on the ground that the registration would involve a false representation, and was not, therefore, a lawful purpose. Of course, the decision does not affect the right of a company to carry on the business of dentist or chemist, but it is an important one, and bears closely on what is known as the " protection of titles."

In England we have had recently a case which is distinctly noteworthy. John Panhans was charged by the British Dental Association with using a description wrongly implying that he was a person specially qualified to practise dentistry. The offences were created by advertisements under the style of the Dental Institute, Limited, of which defendant was the managing director. For the defence it was contended that the advertisements were inserted by the company, which could not be " a person specially qualified to practise dentistry." The magistrate said it was clear the defendant was the sole director of the company, and that he was the only person who practised

dentistry on the company's premises. He quite agreed with the contention that a company could not be a person properly qualified to practise dentistry, and it was no doubt for the purpose of evading the Act that the defendant registered the company. In his opinion such a procedure was clearly within the mischief aimed at by the Legislature, and he accordingly fined the defendant. In bringing the issue to a head these cases are obviously helpful. It is to be hoped that there will be no differentiation in treatment in regard to medical and pharmaceutical companies respectively. It is with this in view that I have cited the action of the General Medical Council in regard to dental cases, and I may also mention in this connexion the approval of the Pharmacy Bill by the medical authorities as pointing in the desired direction.

The Position of Poison Legislation.

Nothing has happened in the Legislature since last I addressed you to overcome the contention of all experts—a contention prompted by knowledge of the dangers connected with the sale of sheep-dips and insecticides—that these articles may be kept out of the hands of the unqualified, untrained retailer. I hinted last year at the origin of the Privy Council Committee and the purpose it was intended to fulfil, and it is sincerely to be hoped, in the public interest, that the Government will not free the sale of poisons for use in agriculture and horticulture from the present restrictions. The consequences would be disastrous, and, in these days when the procuring of legislation is so difficult, not readily repairable. Grave reasons for not disturbing the present conditions—reasons which we all earnestly hope, in the interest of public safety, will carry full weight with the Government departments—have been placed before the Lord President of the Council by the British Medical Association. That Council, in a memorial, expressed the grave misgiving with which those who are aware in the course of their professional duties of the dangers attending the retail sale of poisons in general, and especially in the case of arsenic and carbolic acid, must regard any violation of the salutary principle that those who retail poisons should have their practical knowledge proved by examination. Surprise was expressed in this memorial that no grounds were given in the report of the Committee for arriving at the conclusion that the provisions of the Pharmacy Act could be relaxed without undue risk to human life; and

the fact was emphasised that the evidence demonstrated the manner in which the technical training under the present law operates for the protection of the public. The agitation for free poisons in agriculture and horticulture continues with unabated vigour in a comparatively narrow circle, so far as its participants are concerned. It has extended to Ireland also, in consequence of prosecutions at Ballinasloe and elsewhere, but the Pharmaceutical Society of Ireland has checked at their fountain some of the false statements as to absence of facility for farmers obtaining these substances.

There is just this one point I should like to make on this occasion. The anti-restrictionists have urged that chemists are unable to recommend for the horticulturists or agriculturists remedies suitable as germicides, insecticides, and sheep-dips. The statement is absurd, and one which may be used with great disadvantage to those who were responsible for it, for not only can a chemist, as a consequence of his scientific training, devise more effective formulæ for plant and animal diseases, but his long experience in the protection of the public leads him, in the selection of his agents, to those of a non-poisonous character. That the desirability of a choice in that direction is recognized by leading authorities can be indicated by reference to some of the standard works. For instance, Mr. George Armitage, M.R.C.V.S., formerly lecturer in the Albert and Glasgow Veterinary Colleges, in his book, *The Sheep Doctor*, refers to arsenical poisoning as the result of the use of solutions of the metal for the purpose of sheep-dipping. "As long as the skin is uninjured the solution will be inoperative, but wounds of all kinds favour rapid absorption, and the effects are developed within a short time. Then, again, poisoning arises—and this is the more common—from the dripping of the sheep on the grazing pastures after arsenical solutions have been used, the grass and herbage generally being impregnated with the poison." Mr. Armitage also states in his chapter on remedies employed in dipping or dressing sheep infested with parasites that 'The attention of scientific men has not been directed sufficiently to the destruction of parasites causing skin diseases among animals, particularly sheep; and, except in the recommendations, to use the pernicious preparations of arsenic, corrosive sublimate, etc., etc., it may be said nothing of consequence has been done. The cost of remedies militates greatly against the adoption of many that might prove serviceable, and even the difference of a few pence

between an unsafe arsenical or mercurial preparation and a safe non-poisonous dip is too frequently held as a reason for using the former. We have known farmers use such poisonous preparations, paying at the rate of 6*s*. per hundred sheep, to the great detriment of the wool, pounds being wasted at clipping times; when their neighbours, using the non-poisonous dips, which have cost 10*s*. per hundred sheep, have sold their clip for quite as much more as was gained in the other case. . . . Arsenical preparations, notwithstanding all that can be asserted by means of extensive advertising, fail to destroy the parasites effectively, or prevent the attack of the fly."

That poisonous preparations are not essential in the treatment of plant diseases caused by parasitic fungi is shown by the observation of Mr. George Massee, F.L.S., principal assistant of the Royal Herbarium, Kew, who says that from among the numerous solutions of powders that have been experimented with the following have proved most effective: (1) Bordeaux mixture, (2) ammoniacal solution of copper carbonate, (3) liver of sulphur, (4) solution of iron sulphate, (5) solution of potassium permanganate, (6) paraffin, formalin, lysol, (7) sulphur (powdered), (8) quicklime (powdered).

On the high authority of Professor B. T. Galloway, of the U.S. Department of Agriculture, the formula for fifty gallons of Bordeaux mixture is:—

Water, 50 gallons.
Copper sulphate, 6 lb.
Unslaked lime, 4 lb.

The adhesive properties can be increased by adding soft soap in quantity equal to that of the copper sulphate. It is also advisable to dilute the mixture for spring spraying, and where appearances can be ignored it is the most effective and cheapest fungicide that can be used. I may also mention as most interesting, in view of the dangerous treatment of some plant diseases by fumigation with hydrocyanic acid, that Mr. H. Marshall Ward, F.R.S., Professor of Botany at Cambridge University, in his book, *Diseases in Plants*, says that phylloxera has been treated by plunging into the soil, near the roots, small blocks of some slowly soluble medium, such as gelatin impregnated with carbon bisulphide, the volatile fumes of which kill the insect.

I have found carbon bisulphide to be a most effective ant destroyer, and a safe exterminator of wasps in their nests. I

am informed that this was also found to be the best remedy for the rabbit pest in Australia until this so-called pest was found to be a source of profit. Emulsions of kerosene and turpentine are the most effectual remedies for many kinds of "blight" on fruit trees. Many further illustrations could be given. Research in this direction is full of promise and a matter of national importance. I commend it to you as well worth your attention.

Death Certification.

Last year I quoted from the report of the Select Committee on Death Certification that: "So far as affording a record of the true causes of death and the detection of it in cases where death may have been due to violence, poison, or criminal neglect is concerned, the class of certified deaths leaves much to be desired." Since that time several cases have occurred illustrative of the correctness of those statements. Two cases of poisoning by arsenic have occurred this year, but in neither case was poisoning suspected by the medical attendant or the giver of the certificate, and the suspicion resulting in inquiry was only aroused by circumstances relating to property after the burial of the bodies. The Report of the Royal Commission on Arsenical Poisoning made several recommendations as to the part which should be played by the State with regard to the public health and safety, but when Mr. MacVeagh, M.P., asked the Prime Minister in the House of Commons on Monday, July 25, last whether his attention had been called to the recommendation of the appointment of a special officer with suitable scientific knowledge and adequate laboratory assistance to make authoritative investigation when new risks to health were suspected, the Prime Minister was unable to say more than that the subject was under consideration. The *Lancet* stated that the "distribution of poisons in any promiscuous manner brings the questions of death certification and the disposal of the dead prominently before us."

While the Conference was sitting last year a woman was sentenced at Swansea for obtaining money from an insurance company by false pretences. She had obtained a certificate of her child's death from a doctor, although the child had not died. The doctor had seen the child when ill, but had taken the mother's word as to its death, and he assured the judge that it was the universal thing to give a certificate in such cir-

cumstances in the absence of any suspicion. The result of a local newspaper's inquiry among members of the British Medical Association (at the time meeting in the town) was that the doctor was justified in his action. This instances the weakness of the present regulations governing death certificates. In this connexion I may mention that the London County Council through its Public Control Committee has kept the subject of death certification before the public. It has not been possible for the Council to introduce a Bill, however, as any legislation must be by a general Act applicable to the whole country.

In connexion with the metropolitan borough of St. Pancras I have had forcibly brought under my notice as mayor this year the insufficiency of our present laws to death certification. The borough council are large cemetery owners, and recently the London County Council called attention to the case of a child who had died without having been seen by a doctor within a fortnight of death, and was buried at the cemetery without the production of a certificate of registration, a certificate of death produced at the funeral being accepted as sufficient authority to bury the child. The County Council stated that it was informed this was not an infrequent practice, and having in view the great danger involved it had brought the matter to the notice of the borough council, and asked for an opinion on the points raised. As I indicated in my address last year, the law does not require either notification or registration as a condition precedent to burial or disposal of a body. It merely requires that the cemetery officials shall, subject to a penalty of £10, give notice in writing to the registrar of the district in which the death took place in cases in which a registrar's certificate or coroner's order for burial has not been produced. In the case referred to this was done on the day following the funeral, and no further responsibility rested on the St. Pancras council. With reference to the statement of the County Council that the incident referred to is not an uncommon practice, it may be remarked that out of 2,000 interments at St. Pancras Cemetery during the six months ended January 31 last, only sixteen cases occurred in which no certificate was delivered, which is far below the average for England and Wales, having regard to an answer to a question in the House of Commons that out of 670,000 interments during twelve months, 10,000 took place without burial certificates. The report of the chairman of the baths and cemetery committee of the borough council

remarks that "whilst being satisfied that so far as the Council are concerned, all burials at the cemetery are carried out with careful regard to the law, the opinion was expressed that a more effective system of death certification is requisite, and the County Council were urged to petition the Government to bring in a Bill for that purpose in accordance with the Select Committee's report on death certification; and it was also suggested that all death certificates should be forwarded direct by medical practitioners to the registrar, and by him to the cemetery authorities, instead of being handed to relatives of the deceased."

The Separation of Dispensing from Prescribing.

It will be recollected that last year I urged that the dispensing of prescriptions should not be a function of medical men, but that it was necessary for the safety of the public that the prescribing and dispensing of medicines should be performed by separate individuals, the one specially qualified in diagnosis and prescribing, the other specially qualified in pharmacy. In the elaboration of this contention I pointed at some considerable length to :—

1. The absence of any check on the accuracy of the dispensing doctor, greater safety to the public being ensured when, by the passage of a prescription, the doctor and the chemist act as a check on one another.

2. Mistakes which had occurred in connexion with doctors dispensing. Those were either (*a*) the effect of inadequate training or a confusion of mental processes consequent on the exacting nature of the medical man's duties in diagnosing the disease and determining the remedy, or (*b*) the outcome of employing unqualified dispensers, or (*c*) the result of the regulations as to keeping, dispensing and selling of poisons, which are binding on chemists, not being compulsory in regard to doctors' surgeries.

3. The impunity with which the criminal poisoner is enabled to carry on his or her operations.

4. The very slight protection to the public afforded by the present system of death certification.

Nearly forty years ago, Sir John Simon, in giving evidence as Medical Officer to the Privy Council before a Select Committee of the House of Commons, expressed his strong belief in the necessity for the restriction of the sale of poisons and the dispensing of physicians' prescriptions to persons qualified by

examination. The question of the proposed compulsory separation of dispensing from prescribing has been more prominently to the front since I put forward the above statements, and I feel that the discussions have brought nearer a more proper understanding between doctors and chemists. The medical Press received the suggestions very favourably on the whole, although strong dissent was expressed in some cases. The public Press gave very sympathetic consideration, but as I feel that the importance of the matter is not properly appreciated, I trust that you will excuse my returning to it.

When addressing the Conference at Bristol I gave lists of mistakes in dispensing in doctors' surgeries, chemists' shops, and public institutions, and from the consideration of those cases the deduction was clear that greater safety was given to the public by medicines being dispensed in chemists' shops, the proportion of fatal mistakes in doctors' surgeries and institutions being not only much greater, but evidently due to the absence of systematic arrangements existing and imposed by law in chemists' dispensaries as compared with those in doctors' surgeries and public institutions. It is not necessary for me to dwell on all the events of the past year which support my contentions, but it is necessary that I should refer to some of them, although I may be charged again with telling "gruesome tales."

In September, 1903, at a Hackney inquest on a child fourteen days' old, it was stated that the father was given, at the doctor's surgery, medicine for the child labelled "One tablespoonful to be taken every 2 hours." The nurse declined to administer so large a quantity to so young a child, and sent the father back, when the doctor admitted that he ought to have labelled it "One teaspoonful." In evidence the doctor accounted for the mistake by saying that he was in the middle of his surgery work at the time. In this we have a case, which is only one of many that could be cited in establishing the fact that the doctor's other duties seriously interfere with the proper discharge of his function as a dispenser. Then, again, take a certain inquest in Lancashire in June last. A man was found to have died from an overdose of morphine, and the jury expressed the opinion that the doctor who supplied the sleeping draught causing the death had been careless, and he was censured by the coroner. The instances enumerated last year show that this is no isolated instance of carelessness. They

suggest that some doctors regard dispensing as a "perfunctory formality," and it does not seem the proper thing that men who entertain such a view and men whose training in pharmacy is admittedly inadequate should be entrusted with so important a function, and yet be the only parties entitled to sign a death certificate.

A recent inquest at Cambridge elicited that a doctor's poisonous liniment was in a similar bottle to the medicine he supplied, and that the former had been mistaken for the latter with fatal results. This, of course, is only typical of the cause of a number of accidents through the absence of compulsory regulations regarding the dispensing, etc., of poisons. The rules of the Pharmaceutical Society, framed in accordance with the Pharmacy Act, provide that chemists must: (1) Keep poisons in bottles with a distinctive mark indicating that they contain poisons; (2) store poisons on one of three special systems designed to distinguish the poison bottles from others; and (3) send out liniments, embrocations, and lotions containing poisons in bottles distinguishable by touch, and with a label that the contents are not to be taken internally. That the risk of accidents would be considerably minimised were similar regulations binding on doctors' "closed" surgeries can hardly be gainsaid in view of the sad and many mishaps enumerated by me last year. I think the desirability of this cannot be too strongly emphasised, and I am glad to see that the *Lancet* has, since my address, characterised the regulations of the Pharmaceutical Society as "useful and clear," and has commended them in the following terms:—

"These regulations do not affect medical men or public institutions, but the many stories of tragic accidents with which we are all familiar should convince any one who ever dispenses poisons, and may need convincing of what is obvious, of the urgent need for mechanical reminders of the dangers which attend this work. These methodical ways are necessary to counteract the element of human forgetfulness or human negligence which cannot be eliminated where men sometimes with brains overtaxed with work are employed."

It is an anomaly that chemists dispensing should be governed by certain regulations, but that a doctor should be free to carry on the important function of dispensing in whatever fashion he may please. As you are aware, I go further, and say that not only should regulations as to the dispensing and storage of

poisons be applied to the dispensing carried on at doctors' surgeries and all other places and institutions where medicine is dispensed, but that dispensing should be performed not by the medical man, but by a qualified chemist. The present system is dangerous to the public, and, in order that there may be reciprocal reform in the ranks of pharmacy, I think prescribing by chemists should be abandoned. It may be within your knowledge that the draft Medical Acts Amendment Bill now before the British Medical Association aims at checking the prescribing chemist. It appears, therefore, as a rather one-sided arrangement that many members of the Association should be averse from changing the law as to dispensing in a manner that would conserve it to the pharmaceutical calling, and yet be anxious that Parliament should step in to prevent counter-prescribing, especially when it is borne in mind that death certification by the doctor is a check on the mistake of a chemist, whilst there is no such check on the mistake of a doctor. There is, of course, a large section of the profession that would welcome the reform I advocate, but, judging from discussions, there are many who would not enter into a voluntary local arrangement, let alone approve of any legislative interference. However, I believe that although the time is not yet ripe for an appeal to Parliament, we should keep the matter well in the sphere of medico-pharmaceutical politics, as changes are apparent in the medical profession which, I think, will react in our favour. Neither ourselves nor medical men have said the final words on the matter yet, and I live in the best hope that some good will come of our consideration of the matter here.

There have been two meetings of doctors in the Metropolis which have had a bearing not, perhaps, of the first importance, however—on the subject. I cannot say that these meetings were assisted in a temperate, impartial discussion of the question by the organ of the British Medical Association, which seemed to urge that, while the writing of prescriptions should be based on a sound knowledge of pharmacy, the dispensing of them should be undertaken by persons whose practical experience in dispensing is of the most elementary kind. This journal's idea of "dispensing" scarcely did it credit. "Given a prescription," it said, "which is capable of being read, nothing is easier than to measure out the desired quantities, and mistakes of a character likely to lead the dispensers into the presence of coroners' juries can occur only through the grossest carelessness,

such as no amount of instruction or tuition would prevent."

It is dispensing of that kind that is the inevitable sequence of the lack of adequate pharmaceutical instruction at our medical schools, and it is the kind which we should like to see abolished because we do not think it gives the best service to the public. It is the "bottle-filling" kind of dispensing; and implies stereotyped prescribing, departure from which courts accident. But this journal acknowledges that many medical men would be glad to be relieved of dispensing were there any convenient substitute for it. One must be forgiven a sigh in asking whether the chemist is not a convenient substitute. However, in contrast, we may consider the comment of the *Lancet* on the last presidential address, and read that "the best result may be arrived at by each fulfilling the duty for which his practice prepares him."

The Central Division of the Metropolitan Counties Branch of the British Medical Association has this year had a proposal (referred to above) under discussion by which it was proposed to amend the Draft Medical Bill prepared by the Medico-Political Committee of the Association so as to prohibit any registered medical man from dispensing or supplying drugs or other medicaments to any one. A heavy penalty was named, and exceptions enumerated covering army and ships' doctors, emergency medicines in treatment and districts where both a doctor and a chemist could not be supported. These are, I would ask you to note, proposals *voluntarily brought forward from the ranks of the medical profession.* Although discussion on the additions to the Bill (which were not agreed to) showed a not inconsiderable measure of antagonism to the proposals, there were, most certainly, not lacking signs of a body of opinion in the profession favourable to the separation of pharmacy from medicine wherever practicable. As a concrete example, let me refer to the most recent additions to the correspondence on the subject in the medical journals. A Montgomery medical man wrote to the *Lancet* against the separation of dispensing from medical practice, urging as an argument that he had been unable to procure from the nearest chemists one or two, more or less, out of the way articles. The answer to him is that supply follows demand, and this answer has been given by a London suburban doctor, who admits that "many drug-shops are not so fully stocked with all the requisites of treatment as they should be. The reason is clear; so long as medical men continue to dispense, demands

upon the druggist will be comparatively few. Let them cease dispensing and they will allow an expansion of trade which will ensure that the druggist maintains a supply adequate to the needs of his customers. The prices quoted by your correspondent must be extreme in any place. In this part of London 1*s.* is about the usual charge for dispensing a prescription. I think there can be very little doubt that the educated druggist of to-day is as a rule what he certainly ought to be—the fittest person to carry out that work of dispensing for which he has been carefully and expressly instructed."

Reform in Public Dispensing.

In the realm of institution-dispensing there have during the year been important developments. Public bodies like the London County Council and the Prison Commissioners (both of whom insist on their dispensers holding at least the Minor qualification of the Pharmaceutical Society) have given some financial recognition of their dispensing officers' services by increasing their rate of remuneration, and in the case of the L.C.C. by granting the distinctive title of "dispensing chemist." But—and I would gladly draw the veil over the calamity to which I am going to refer—there has been a terrible dispensing accident in an institution where there was no official dispenser, as such, and the dispensing was in the hands of the medical officers. Four lunatics were poisoned. The dispensary arrangements appeared to be loose, the head attendant being allowed to dispense under the supervision of the medical officers. The jury added to a verdict of "Misadventure" a rider that the dispensing should in future be performed by a fully qualified person. Sir Albert Rollit mentioned this sad affair in the House of Commons, asking the President of the Local Government Board what steps would be taken to carry the rider into effect, and—more important still—whether the Local Government Board would cause regulations to be made requiring all dispensaries in public institutions to be in charge of persons registered under the Pharmacy Acts. From the answer it could only be gathered that communications were taking place between the Board and the Lunacy Commissioners. The Public Dispensers' Association has also taken the matter in hand by petitioning the Local Government Board, praying that only qualified chemists should be appointed, and the Dispensers' Committee of the Pharmaceutical Society is collecting information which I trust

will lead to early action, with good results. I may add that the disaster at the Portsmouth Asylum more than ever emphasises the desirability of regulations similar to those of the Pharmaceutical Society regarding the keeping, storage and dispensing of poisons being binding in all places where the work of dispensing is done. Dispensing in the Army is still conducted in a very unsatisfactory manner, and among the numerous schemes of Army Reform which have been put forward, nothing has been done or even suggested to place the system of "compounding" on a safe and proper footing.

The Repetition of Prescriptions.

Another phase of the dispensing difficulty has been considered by doctors. A movement was initiated in the medical journals by a discussion on the repetition of prescriptions, it being suggested that prescriptions should be endorsed with such terms as "not to be repeated." Arising from this correspondence a meeting was held this year by the Wandsworth Division of the British Medical Association, when it was resolved :—

"That, with the view of checking the indiscriminate dispensing of dangerous drugs, the Central Council of this Association be requested to appoint a committee to investigate the subject of the repetition of prescriptions either alone or in conjunction with the Pharmaceutical Society, and to report what steps should be taken to remedy the present grave defect of the law."

And the Medico-Political Committee of the Association has recommended certain proposals which have been adopted by the Council of the Association, viz. :—

1. That the prescriber should state on the prescription that "This prescription shall be dispensed times only."

2. That it should be made the duty of the dispenser to stamp each prescription, every time that it is dispensed, with the date of such dispensing.

3. That in every case in which a prescription shall, as shown by the date stamped thereon in accordance with the foregoing recommendation, have already been dispensed for the number of times indicated by the prescriber, and in every case in which the period indicated by the prescriber for the repetition shall have expired, it should be the duty of every qualified dispenser to whom such a prescription may be submitted for dispensing to refuse to dispense the same.

In the opinion of the Committee it would only be possible

to carry out the foregoing recommendations by alteration of existing legislation. I observe that the Council of the Association has appointed Sir Victor Horsley, Dr. Greenwood, Dr. Heron and Mr. Messiter as a committee to confer with representatives of the Pharmaceutical Society, and I am glad to know that a conference has been arranged. For myself, I feel doubtful of the practicability of effecting by legislation any improvement of the kind suggested. Chemists are always willing to follow the directions on a prescription if they are clearly expressed, and I cannot help thinking that medical men might safely trust to the honesty, the sense of responsibility, and the discretion which nearly every qualified chemist possesses and is frequently called upon to exercise, rather than attempt to pass into law a provision which is doubtfully practicable. Another matter of interest to which allusion might be made is that at the representative meeting of the British Medical Association at Oxford last month a resolution was agreed to requesting the Central Council to draw the attention of the medical profession individually to the fact that by recommending certain drugs and certain preparations of those drugs by names of proprietors they are not only allowing themselves to be used indirectly as touts for wholesale druggists, but are also helping their patients to form serious habits of drug abuse.

In conclusion, I desire to express my deep-felt conviction of the necessity of the chemist receiving such a general education as will enable him at any time, if he so desires, to proceed to the ranks of such allied callings as those of analytical chemistry and medicine, and to feel always that he stands on the same plane of intelligence and culture as members of those professions. Throughout my life I have felt that I could have discharged my work and my duties with much greater efficiency had I received a better fundamental education.

It also seems to me, and in this I speak for myself alone, that we can best extract respect from the medical profession not only when we prove that we have exceptional knowledge in our own branch, but also when our students have a clear road to become medical men themselves, if they desire to do so. Preliminary education for pharmacists must be on as high a standard as that of the higher branches of the profession. Education is one of the greatest aids in effecting the reforms in medical practice which I have advocated above. And in regard to these reforms I have endeavoured to show that we do not wish to

usurp the rights of medical men. Rather we desire to respect those rights, believing that by so doing we shall secure our own rights, which are only those rights that are necessary for the safety of the public.

Mr. R. A. Robinson proposed a vote of thanks to the President for his admirable and reasoned address. The question of chemists dispensing prescriptions a certain number of times was, he thought, one which must be arranged between the doctor and his patient. If the medical man wished the patient to take a medicine only once or twice, he must tell the patient so, and the patient must agree. Certainly the chemist could not allow himself to be put under any penal clause if he dispensed it; he would do the best he could, and it would not be possible to lay such restrictions upon him as to make him responsible at the time the prescription was dispensed. He did not minimize the importance of the matter—with certain medicines it was most important that they should not be taken indiscriminately for a large number of times—but his opinion was that doctors must tell their patients, and then the chemist would faithfully and loyally carry out the wishes of the prescriber. With regard to pharmaceutical legislation, Mr. Robinson said it was well known that the present law was unfair to the individual qualified man, and every one present knew the efforts that had been made, were being made, and would be made, to get the law put right if they could. If they could not get it put right as far as they would like, they must get as much as they could from Parliament. It was essential and important that they should no longer be subject to the unfair competition to which they were subjected under the present law. The President's references to death certificates made him rather creep with horror. Mr. Idris told them that hundreds of thousands of persons were buried every year without proper death certificates. He felt inclined to say that he would refuse to be buried himself until the thing was put on a better footing. Another important point was the question of non-poisonous preparations—insecticides. He (Mr. Robinson) had seen the Minister of Agriculture several times during the past year, and had submitted to him the formulæ for non-poisonous insecticides and weed-killers, which Mr. Holmes, the Curator to the Pharmaceutical Society, got together for him, and had shown him the non-poisonous forms. The Minister, however, was influenced largely by a long investigation into the matter which had taken

place in America, and at present thought the weight of evidence not strong enough—the poisonous ones held the field. If they could show that there were insecticides which were non-poisonous and quite as efficacious as the poisonous ones, they would render a service to the craft. He was very glad to hear the President's remarks in regard to the Formulary Committee. From the moment that the Pharmaceutical Society, for great reasons—reasons which he believed they all endorsed, reasons which were perfectly satisfactory—decided to bring out a Compendium of Medicines, it had expressed its willingness to meet the Formulary Committee. Members of the Conference said the new book might be unfair to their Committee, and suggested that some arrangement should be made. At that moment the Pharmaceutical Society said "Yes." He could not imagine the slightest discord in the matter. The Conference and the Society had been so bound up together from the commencement, the same men had been loyally working for both, that it seemed impossible to imagine any difficulty in coming to what they believed to be a just and generous conclusion. He had no doubt the members of the Conference would feel that the Pharmaceutical Council had done its duty in having resolved to bring out a Compendium not in competition with the Formulary, but having, if he might say so, a larger object in view than that. The Society would be very happy indeed to pay seventy guineas to acquire the rights of the Formulary. He understood that it was always a doubtful point whether an official Formulary should be issued by the Council itself or by the Formulary Committee. He desired to emphasise the pleasant relationships that had always existed between the Council and the Conference. At Sheffield, twenty-five years ago, the course of the proceedings was very similar to the course that day. The President then—Mr. Schacht—was the Vice-President of the Pharmaceutical Council, and Mr. Sandford, the President of the Pharmaceutical Society, proposed a vote of thanks to him. They were much indebted to Mr. Idris for his labours. They would read his paper with much interest, and he hoped for the best results from the meeting in Sheffield.

Mr. CURRIE seconded. A few weeks ago, he said, he met Mr. Idris in the lobby of the House of Commons and had the temerity to ask him what he was going to speak upon at the Conference this year. Mr. Idris told him he thought he had exhausted his energies. He was not sure what he would take for his subject, but certainly he had not done anything towards

it. Now, after the lapse of about four weeks, they had heard what Mr. Idris had committed to paper. He had given them a very valuable contribution towards pharmaceutical legislation. Mr. Idris was to be congratulated upon having the benefit of his convictions in respect to the very important point of prescribing and dispensing, and they could not too strongly accentuate his remarks upon it. If Mr. Idris would only continue to give them information relative to the accidents which took place owing to medical men dispensing their own prescriptions, he felt sure that the pharmacists of the country would benefit very largely. With regard to legislation, he hoped the time was not very far distant when they would have in Mr. Idris a good representative in the House of Commons. He was satisfied that they would then have a champion who would be able to carry them successfully to victory. He hoped that the repetition of prescriptions scheme would not receive the sanction of Parliament. Chemists, druggists, and pharmacists throughout the country had plenty of millstones round their necks without having any more added to them. He agreed with the President of the Pharmaceutical Society that they were quite able to be left to themselves and to use their own discretion, supported, of course, by medical men.

Mr. MARTIN, in supporting, expressed regret at the absence of Mr. S. R. Atkins and Dr. Attfield, in consequence of which he stood in the position of Senior Vice-President of the Conference present at that meeting. It would take up the whole time of the Conference to adequately discuss and appreciate Mr. Idris's address. He thanked the President for the kind words he had spoken and the history he had given of the Formulary Committee. It was satisfactory to know that the labours of the Committee had been appreciated. Mr. Idris touched on many subjects which showed his knowledge and his research, and it was a marvel how, with all his public work, he could find time to make himself so intimately acquainted with the affairs of pharmacy. They would reap a great reward, when the day came —some people hoped it would come very soon—when Mr. Idris would take his place as one of the legislators of the country. Then the intimate knowledge which he possessed would undoubtedly enable him to be of practical benefit to pharmacy.

The resolution was carried with acclamation.

The PRESIDENT, in reply, said, although the address was not by any means what he would have liked it to be, he still ventured

to hope that it would have some profitable result in the discussion that might ensue later on.

Mr. PECK announced that letters of apology had been received from Dr. Attfield, Mr. S. R. Atkins, Dr. George Coull (Edinburgh), Messrs. Albert Cooper (London), Matthews (Bristol), Dott (Edinburgh), Twinberrow (Worcester), Holmes (Curator of the Pharmaceutical Society's Museums), J. C. C. Payne (Belfast), W. Prior Robinson, J. F. Harrington (London), W. Garsed, and F. W. Branson (Leeds), and the PRESIDENT added that he had one from Mr. Walter Hills (Treasurer of the Pharmaceutical Society).

The next business was the

RECEPTION OF DELEGATES.

The delegates who had been appointed were :—

Pharmaceutical Society of Great Britain.—Messrs. R. A. Robinson (President), J. R. Young (Vice-President), Walter Hills (Treasurer), S. R. Atkins, M. Carteighe, W. G. Cross, W. L. Currie, W. H. Gibson, R. L. Gifford, W. S. Glyn-Jones, J. F. Harrington, G. T. W. Newsholme, and C. Symes.

Pharmaceutical Society of Great Britain (*North British Branch*).—Messrs. D. B. Dott (Chairman), Alex. Strachan (Vice-President), W. B. Cowie, W. L. Currie, W. Giles, J. P. Gilmour, and W. P. Wilson.

Pharmaceutical Society of Ireland.—Messrs. W. F. Wells (Vice-President), G. D. Beggs, J. W. Nicholl, D. M. Watson.

Aberdeen Pharmaceutical Association.—Messrs. W. Giles (President), J. Paterson (Treasurer).

Bradford and District Chemists' Association.—Messrs. A. Hanson, John Jackson, R. W. Silson.

Bristol Pharmaceutical Association.—Messrs. H. E. Boorne (Secretary), G. T. Turner.

Brighton Association of Pharmacy.—Messrs. W. H. Gibson (President), R. A. Cripps, C. Blamey, W. W. Savage, C. G. Yates.

Cambridge Pharmaceutical Association.—Mr. E. Saville Peck.

Cheltenham and District Chemists' Association.—Mr. W. Barron.

Dover Chemists' Association.—Mr. R. M. Ewell.

Exeter Association of Chemists and Druggists.—Messrs. H. W. Gadd, F. W. Vinden.

Forfarshire District Chemists' Association.—Messrs. A. B. Anderson, A. Naysmith, J. Russell.

Glasgow and West of Scotland Pharmaceutical Association.—Messrs. J. P. Gilmour (Secretary), R. Brodie, W. L. Currie, R. McAdam, G. Robertson.

Grimsby and District Chemists' and Druggists' Association.—Messrs. C. Willson (Vice-President), H. W. Colley (Secretary).

London Chemists' Association.—Messrs. R. B. Betty, A. Cooper, W. S. Glyn-Jones, J. Holding, T. H. W. Idris, Leo Atkinson, J. C. Umney, W. Watson-Will.

Western Chemists' Association of London.—Messrs. J. W. Bowen (President), J. F. Harrington, R. A. Robinson, S. J. Weston.

London Chemists' Assistants' Association.—Messrs. J. Arrowsmith, W. Matthews, C. J. Strother, and W. S. Parker (Secretary).

Leeds and District Chemists' Association. Messrs. J. H. Beacock, F. W. Branson, R. Fourness, F. C. Long (Secretary), T. J. Preston, F. Pilkington Sergeant, G. Worfolk.

Liverpool Chemists' Association.—Messrs. J. Alexander, T. F. Abraham, R. C. Cowley, Ed. Evans, junr., Herbert Evans, J. Shacklady.

Manchester Pharmaceutical Association.—Messrs. H. Kemp, J. C. Kidd, W. Kirkby, J. Grier, A. J. Pidd, F. A. Ringer, and J. Wild.

Midland Pharmaceutical Association.—Messrs. A. W. Gerrard (President), F. H. Alcock, J. A. Radford (Secretary), H. A. Jones, J. Poole, G. E. Perry.

Newcastle and District Chemists' Association.—Messrs. T. M. Clague, G. Foggan, C. F. Merson, and W. Pescod (Secretary).

North Kent and District Chemists' Association.—Messrs. R. Feaver Clarke (Secretary), H. Cook, A. Goldthorpe, and E. Millhouse.

Nottingham and Notts Chemists' Association.—Messrs. A. Eberlin and A. Middleton.

Oxford and District Chemists' Association.—Messrs. J. W. Todd (President), and G. C. Druce.

Plymouth, Devonport, Stonehouse, and District Chemists' Association.—Messrs. J. Barge (President), and J. Davy Turney.

Sheffield Pharmaceutical and Chemical Society.—Messrs. H. Antcliffe, J. Austen, P. Carr, R. D. Douglas, J. F. Eardley, A. R. Fox, J. G. Jackson, T. G. W. Newsholme, J. B. Pater, G. Squire, J. W. J. Turner, and H. G. Williams.

Mr. MARTIN raised the question of whether all the delegates were members of the Conference. He thought some steps ought to be taken to ascertain.

The PRESIDENT assumed that no one would attend as a delegate without asking to be admitted to membership of the Conference. If that was not the case, he thought the matter deserved attention.

Mr. WHITE read the report of the Executive as follows :—

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee beg leave to make their report upon the work of the forty-first year of the Conference.—Thirteen members have resigned, sixty-eight new members have been elected, and fourteen members have been removed by death. Special mention must be made of the late Barnard Simpson Proctor, who was one of the founders of the Conference in 1863, the author of the first paper read at its meetings, and of many other original communications since. He was a model leader in pharmacy—a man of science and a staunch friend—and in him British pharmacy possessed and has lost one of its brightest ornaments. The death, too, of Alfred H. Allen, public analyst of Sheffield, causes a pathetic coincidence, occurring as it has done immediately before the meeting of the Conference in his town. He had for several years contributed papers of great interest and value to the Conference, and his genial company will be very much missed at Conference meetings. A paper which he had prepared in collaboration with Mr. Arnold H. Tankard, and which he doubtless had hoped to have been able to read himself, will be read at this meeting. The Committee regret also to record the death of Mr. W. Ward, who was Chairman of the Local Committee at the last Sheffield meeting in 1879. The death of John Barclay, in July, 1903, occurred on the eve of the annual meeting, but too late for reference in the last report. In him pharmacy has lost one of its most able exponents, and one who, during a comparatively short career, had displayed exceptional ability in the prosecution of research.

The relationship of the Formulary, and the proposed Compendium of the Pharmaceutical Society has occupied the serious attention of the Executive, and several meetings have been held to consider the same during the year. It was thought advisable,

before coming to a definite decision upon the matter, to call a special general meeting of the members to discuss the whole matter. This was summoned for Tuesday, May 17, and was held by kind permission at the Pharmaceutical Society's rooms. Mr. J. C. Umney moved and Mr. F. C. J. Bird, Honorary Secretary of the Formulary Committee, seconded, that "The Council of the Pharmaceutical Society be asked to make a definite offer to the British Pharmaceutical Conference for their formulæ already published and those in readiness for publication, which publication was delayed owing to the proposal of the Pharmaceutical Society to publish a 'Compendium of Medicines.'"

A long and animated discussion followed, in which several prominent members of the Conference and Pharmaceutical Society's Council took part, and the motion was eventually carried unanimously.

The terms of this resolution were accordingly conveyed by letter to the Secretary of the Pharmaceutical Society on May 25, and the following reply was received on July 13:—

Pharmaceutical Society of Great Britain,
17, Bloomsbury Square,
London, W.C.,
July 12, 1904.

The Secretaries,
British Pharmaceutical Conference.

Dear Sirs,—With further reference to your letter of May 25, which was remitted by the Council to the Compendium Committee for consideration and report, I am desired to acquaint you that the Compendium Committee, after carefully considering the matter to which your letter relates, brought up last Wednesday the following report:—

The Committee recommends the Council to authorize the President to confer with the President of the British Pharmaceutical Conference, with a view to the acquisition of the formulæ of the Formulary Committee, and to offer such honorarium as may be thought suitable.

The recommendation was duly adopted by the Council, and the President has since the meeting been able to confer with the President of the Conference. As a result of the interview between the two Presidents, I am able to inform you that it has been agreed to offer the Conference an honorarium of seventy guineas in connexion with the

transfer of the material in the hands of the Formulary Committee.

This proposed agreement is, of course, subject to ratification by the Council, but I feel sure that the action of the President will be confirmed by his colleagues at the August meeting of the Council.

I am, yours faithfully,
(Signed) RICHARD BREMRIDGE, *Secretary.*

Confirmation of the recommendation of the Compendium Committee was received on August 5 in the following letter :—

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN,
17, BLOOMSBURY SQUARE,
LONDON, W.C.,
August 5, 1904.

Dear Sirs,—With reference to the correspondence that has taken place between this Society and the Executive of the British Pharmaceutical Conference on the subject of the B.P.C. Formulary and to my letter of July 12, intimating that it had been agreed by the President of this Society, in consultation with the President of the Conference, that an honorarium of seventy guineas should be offered to the Conference in respect of the acquisition of the material now in the hands of the Formulary Committee, I have now the pleasure to inform you that at the meeting of the Council held here on Wednesday the above offer was unanimously confirmed.

Will you, therefore, be so good as to convey to the Conference the fact that the Council now officially makes the offer of the above-mentioned honorarium, and, in the event of the Conference accepting the offer, will you please communicate with me, in order that arrangements might be made for the immediate completion of the matter ?

I am, yours faithfully,
(Signed) R. BREMRIDGE, *Secretary.*

The Hon. Secretaries of the
British Pharmaceutical Conference.

These letters have been carefully considered by the Executive Committee at their meeting on Monday, August 8, and it was

agreed to refer the whole subject to the general meeting to decide upon the acceptance or rejection of this offer.

A grant of £5 has been made to M. W. W. S. Nicholls to investigate the drug Damiana. He reports that the work is in progress, but not sufficiently advanced to enable him to make a report to this meeting.

The General Index of the *Year-Books of Pharmacy* from 1886–1903, is well in hand, and will be completed as soon after as possible the next issue of the *Year-Book*. Mr. J. O. Braithwaite, the editor, reports that the MSS. of Parts I—IV of the *Year-Book* are in the hands of the printer.

The Executive again ventures to draw the attention of members to the necessity of increasing the membership, and cordially invites all those interested in the welfare and progress of pharmacy to join the Conference.

Mr. Beggs proposed that the report be adopted.

Mr. W. Gowen Cross seconded, and expressed the hope that as the years went on, and a number of young pharmacists became qualified, the roll of membership would grow much larger.

The resolution was carried.

Financial Statement.

Mr. Umney, in presenting the financial statement, said it did not appear so favourable as last year's. This was accounted for, however, by the fact that the subscriptions covered a period of twelve months last year, but the accounts were issued a little earlier this year. That had righted itself during the course of July this year. There were considerably greater expenses connected with the publication of the *Year-Book*, amounting to about £40, as some of the papers last year were very long, and some forty or fifty more pages were wanted. That extra £40 had almost neutralized the saving in the salary of the editor, but still, they did not want to cut down the *Year-Book*, because they recognized it was a very valuable asset, and was what the members of the Conference looked to for a report of the proceedings. Subscriptions had come in very well since June, and if they got the seventy guineas which had been referred to he was sure they would not lose hope that the Conference was self-supporting and a success.

The report was adopted, on the motion of Mr. Maltby Clague (Newcastle).

Financial Statement for the Year Ending June 30, 1904.

1903.	Dr.	£	s.	d.	£	s.	d.
July 1.	To Assets forward from last year:—						
	,, Cash at Bank	68	17	6			
	,, ,, in Secretary's hands	12	19	7			
					81	17	1
1904.							
July 1.	,, Members' Subscriptions	246	19	0			
	,, Lost Postal Order Recovered	0	2	6			
					247	1	6
	,, Sale of *Year-Book* by Publishers	13	0	0			
	,, Sale of *Year-Book* by Secretary	1	0	0			
					14	0	0
	,, Advertisements in *Year-Book*	60	18	9			
	,, Amount received for Index	6	4	0			
	,, Sale of Formulary	2	10	5	69	13	2
	,, Liabilities on Open Accounts:—						
	Butler & Tanner	171	13	5			
	McCorquodale & Co.	5	13	0			
	Due Assistant Secretary for Salary and Rent for one Quarter, ending June 30	13	15	0			
					191	1	5
	,, Bell & Hills Fund				27	8	1
	,, Asset on Last Year's Account realized since J. and A. Churchill				65	0	5
					£696	1	8

The Bell and Hills Fund.

1903.		£	s.	d.	£	s.	d.
July 1.	To balance from last year	27	17	10			
	,, One year's Dividend on Consols	8	12	0			
					36	9	10
Oct. 10.	By Kimpton, H., account for books				9	1	9
					£27	8	1

,, Assets:—
In account with British Pharmaceutical Conference
£360 2½% Consolidated Stock

The British Pharmaceutical Conference Research Fund.

1903.		£	s.	d.	£	s.	d.
July 1.	To Balance	43	5	0			
	By Grant to Mr. Nicholls (Damiana research)	5	0	0			
					£38	5	0

Examined and found correct,
July 14, 1904.

J. W. BOWEN,
W. Prior ROBINSON, } Auditors.

1903.	Cr.	£	s.	d.	£	s.	d.
July 1.	By Bell & Hill's Fund from last year . .				27	17	10
1904.							
	,, Expenses of *Year-Book* for 1903—						
	,, Printing, Publishing, Binding . . .	242	18	5			
	,, Banding and Parcelling	3	15	0			
	,, Postage and Distributing	14	9	1			
	,, Advertising, 20*s.* 6*d.*, Publisher's charges, 2*s.*	1	2	6			
	,, Commission on Sales	15	4	8			
	,, Editor's Salary	100	0	0			
					377	9	8
	,, Expenses of "Formulary":—						
	,, Commission on Sale by Publishers . .	0	5	1			
	,, Stationery and Dies	1	9	0			
	,, Telegrams and Stamps	1	0	0			
					2	14	1
	,, Sundry Expenses:—						
	,, Assistant Secretary Annual General Meeting	10	0	0			
	,, Boorne, H., Bristol Programmes . .	2	2	9			
					12	2	9
	,, Assistant Secretary's Salary for one year to date	45	0	0			
	,, Rent of Office one year to date . . .	10	0	0			
					55	0	0
	,, Postages, £7 10*s.*; Editor, £1 3*s.* 10*d.* .	8	13	10			
					8	13	10
	,, Printing and Stationery:—						
	McCorquodale	6	10	6			
	Carling & Co.	0	17	6			
	Editor	0	6	4			
					7	14	4
	,, Petty Cash				7	15	0
	,, Foreign Journals for Editor . . .				5	2	0
	,, Bank Charges, 2*s.* 4*d.*; Cheque Book, 4*s.* 2*d.*.				0	6	6
	,, Liabilities of last year, since paid:—						
	Butler & Tanner	133	13	2			
	McCorquodale	2	16	0			
	Assistant Secretary's Salary . . .	13	15	0			
	Carling & Co.	0	18	6			
					151	2	8
	,, Cash in Secretary's hands	10	11	0			
	,, ,, ,, Hon. Treasurer's hands:—						
	(Petty cash)	3	15	0			
					14	6	0
	,, Balance at Bank				25	17	0
					£696	1	8

Mr. Martin then presented the report of the Formulary Committee, which was received on his motion, seconded by Dr. Symes.—(See next page.)

Report of the Formulary Committee.

August, 1904.

Following the report which was presented to the Conference at the last annual meeting at Bristol, the Formulary Committee continued its work, and the first formal meeting was held on October 22, 1903, when Mr. N. H. Martin was re-elected Chairman, and Mr. F. C. J. Bird Secretary. At this meeting a number of proposed new formulæ were considered, and specimens illustrating many of these (which had been prepared and stored under usual conditions for some months, in order to test their stability and keeping properties) were inspected. The work of the Committee was found to be nearing its completion, so that it would have been possible to have issued another edition of the B.P.C. Formulary at an early date.

The position of the Formulary Committee was discussed in relation to the new departure of the Pharmaceutical Council in deciding to compile and publish a Compendium of Medicines. After due deliberation, it was decided that as nothing was known as to the extent to which the Compendium of Medicines would traverse the ground covered by the Formulary, the work of the Committee should remain in abeyance until after the next meeting of the Pharmaceutical Council.

On November 10, 1903, at a meeting of the Conference Executive, Mr. N. H. Martin asked, on behalf of the Formulary Committee, for the opinion of the Executive with regard to the Society's Compendium, and, after considerable discussion, it was decided to ask the Council of the Pharmaceutical Society to indicate to the Committee of the B.P.C. the scope of its projected work, in order to determine how far that work would clash with the B.P.C. Formulary.

As a sequel to this, on December 2, 1903, an informal conference took place between the Compendium Committee, with Mr. Carteighe as Chairman, and Messrs. Bird, Naylor, Umney and White representing the B.P.C. Formulary Committee, with the object, if possible, of arriving primarily at the actual nature of the work contemplated by the Pharmaceutical Council, and also of coming to some understanding between the two bodies, as to the requirements on either side. After a long talk, it was agreed that the Council of the Pharmaceutical Society should send a written reply to the Conference Secretary, and also a draft of titles of preparations to appear in the Compendium,

including a few typical formulæ, to be laid before an early meeting of the Conference Executive. It was further considered advisable, subject to the sanction of the Executive and on the invitation of the Council of the Pharmaceutical Society, that the Conference assist on terms of equality in determining the scope of the Compendium and its compilation.

On December 21 another meeting of the Formulary Committee was held, and a long discussion ensued respecting the Compendium. Finally, a resolution was drawn up to be recommended to the Executive to the effect that if an invitation was received from the Council of the Pharmaceutical Society for the members of the Formulary Committee to confer with them as to the necessity for and scope of the Compendium, further consideration should be given to the matter. This resolution was recommended for adoption at a subsequent meeting of the B.P.C. Executive on the same day. At this point a letter was received from the Chairman of the Compendium Committee of the Pharmaceutical Society in answer to that sent by the B.P.C. Executive on November 14, 1903, in which it was stated :— "As a result of that informal interchange of views I am authorized to say that it is desired to have the co-operation of the British Pharmaceutical Conference in the production of the projected work, and that the Compendium Committee would be glad if the Executive Committee of the Conference could see its way to appoint a small committee, with power to arrange the basis upon which it might be practicable to place at the service of my colleagues and myself the experience and scientific attainments of the members of the Formulary Committee."

At a meeting of the B.P.C. Executive on January 25, 1904, a sub-committee was appointed (Messrs. N. H. Martin, J. C. Umney, W. A. H. Naylor, F. C. J. Bird, and Dr. Symes) to confer with the Compendium Committee, and a reply was also drafted and directed to be forwarded to the latter by the Honorary Secretaries.

The result of this was an invitation by the Chairman of the Compendium Committee to the B.P.C. Sub-Committee to meet them on March 2, 1904, for the purpose of learning any proposals that might be put forward, and to consider the whole question.

At this meeting the Compendium Committee was represented by the Chairman and Messrs. Allen and Newsholme. After some discussion, the Chairman informed the Sub-Committee

that the assistance they were prepared to accept was that individual members of the Formulary Committee might continue their work, and from time to time hand over the result of their labour to the Compendium Committee to be dealt with as the latter thought fit.

The Formulary Sub-Committee reported this to a meeting of the Conference Executive on April 19, and the latter recommended that a special meeting of the members of the Conference should be called to consider the desirability of placing the B.P.C. Formulary at the disposal of the Pharmaceutical Society.

A special general meeting of the Conference was therefore held at 16, Bloomsbury Square, London, on Tuesday, May 17, at 4 p.m., and the whole matter was thoroughly discussed. Finally, it was resolved unanimously that the Council of the Pharmaceutical Society be asked to make a definite offer to the British Pharmaceutical Conference for their formulæ already published and those in course of preparation, the publication of which was delayed by the announcement of the Council in connexion with their Compendium.

The further development of the situation is in the hands of the Executive Committee, and the result will be placed before the Conference for its decision.

Discussion on the B.P.C. Formulary.

Mr. Umney formally proposed that the offer of the Pharmaceutical Society of seventy guineas as an honorarium to the Conference for its Formulary be accepted. He believed that in the first instance the Pharmaceutical Society intended to issue a publication primarily to cover difficulties under the Medicine Stamp Act. This was subsequently modified, and it was decided to publish what had now taken the form of a Compendium of Medicines. At that time the Conference Formulary Committee was engaged on the work of preparing a fresh edition, and towards the end of the year that edition was practically complete, or the work for it was ready. Observing, however, that the Society proposed to publish a Compendium of Medicines, which must necessarily cover a great deal of the ground that the Formulary Committee's works did, it was suggested that the Formulary should be held in abeyance until they had some statement from the Pharmaceutical Society or from the Compendium Committee as to the scope of their work. The negotiations had been detailed in the report, and it had appeared to the

Executive Committee, and also to the Formulary Committee, that as the ground must be covered it would be useless for them to publish their work. If they did, the whole of it would be incorporated in the Compendium—of course, with acknowledgment—just as was done now in standard works of pharmacy. In addition to that, there would probably be very little sale for the Formulary, which had hitherto resulted in a fair profit to the Conference. Having that in mind, they asked the Pharmaceutical Society how they would compensate the Conference for what was to a certain extent a loss of income, assuming that there was a necessity for the book which the Society proposed to publish.

Mr. F. C. J. Bird seconded, but wished to reserve his remarks.

The President thought it was but fair that Mr. Bird should give his reasons.

Mr. Bird said his chief reason was that there seemed to be no other course open to them. There was not room for two publications of the kind. As members of the Conference, they were all loyal to the Society, and if the work was to be done, and only one body could do it, he thought that, the Council of the Pharmaceutical Society having decided to undertake it, they ought to help them as far as they possibly could.

Dr. Symes supported. He said the Formulary was a sort of child of his, for many years ago he argued in favour of it, and had some trouble in convincing the Conference that it was the right thing to publish the book. It was left to Mr. Richard Reynolds, a stronger man than himself, to persuade them that it was really a desirable thing. The reasons for publishing it need not be repeated now, but those reasons were none the less to-day than they were on that occasion. There were long intervals between the publication of the various editions of the Pharmacopœia. When new remedies came forward they had to be tested by the medical profession, and a great many of them were doomed to an early grave. But some of them did survive, and the only means by which they could efficiently test them was by providing for a good preparation of each remedy and a uniform method of preparing it, so that a medical man prescribing a new remedy might be able to get it dispensed under the same conditions, and the drug prepared with the same care, in one part of the country as in another. This was enlarged on at the time, and resulted ultimately in the publication of the book. Although he supported the resolution, yet, if they asked him whether he thought the Pharmaceutical Society or the Con-

ference should publish that kind of book, he still thought that it would be better done by the Conference. It was not a function of the Pharmaceutical Society. That Society had a great many duties to perform, and performed them ably, but there was no obligation upon it to publish a book of that kind. Further, it was doubtful whether, by doing so, it did not give a more official character to the publication, and accept greater responsibility, so that if there was any complaint against the Formulary it would be of a more serious character. The Council of the Society consisted of twenty-one men, and a majority of seventeen to four decided that it was desirable that a book of that particular kind should be published by them. It then became evident that there was no room for the two. The Conference had received a considerable amount of courtesy from the Pharmaceutical Society. They used the Society's rooms, had every facility for their meetings, and were largely supported by the Council. There had never been any jealousy as to their proceedings, as to taking precedence in various matters, and so on. Therefore they felt that there was a certain amount of courtesy due to the Council in considering the matter. The minority made their protest, but they felt that it was ultimately their duty to be loyal to the majority representing the Society. The discussions had been of a friendly character, and the present proposal, he thought, was fair and reasonable. At first it was thought that the Formulary Committee were putting too high a value on their work, and had really nothing to hand over that the Council could not take without asking. A little friendly intercourse had taken place, however, and now the Council recognised that they were getting value for their money. The Formulary Committee also recognised that in relinquishing the book, which they did with regret, they were placing it in good hands, and that it would appear in a larger form.

Mr. W. S. Glyn-Jones said the report of the Formulary Committee contained a reference to a communication from them to the Pharmaceutical Society asking to be consulted as to the scope of the Compendium. He asked whether the two bodies had met with the object of discussing the scope of the Compendium, and, if so, what the result had been.

Mr. N. H. Martin said reference had been made to friction and to discord, but it was absolutely impossible that there should be friction or discord between members of a family. Bloomsbury Square was still the Mecca of pharmacy, although

its walls were broken down and thistles grew where they looked for fruit. It was the home of pharmacy, and nobody could speak disrespectfully of his home, however sorry he might be for the things done there. His hearers were members of the Conference and members of the Society. They paid their subscriptions to both, and were equally loyal to both. Mr. Carteighe, the author of the Compendium scheme, was his personal friend, and had been so for thirty years. Where he differed from Mr. Carteighe in matters of public policy and in methods it was painful for him to have to state them. He moved the following amendment, which it was his duty to move in the interests of the Conference:—"That the Pharmaceutical Conference, having carefully considered the offer by the Council of the Pharmaceutical Society of an honorarium of seventy guineas to give up its rights in the Conference Formulary, begs to decline the same, in order that the Conference may remain free to pursue any course which it may deem best for pharmacy." He traced the history of the Formulary Committee, and quoted the opinions of several eminent gentlemen with regard to the body by whom the Formulary should be published. He also dwelt on the long service of the members of the Committee—Messrs. Greenish, Groves, Martindale, Symes, Thresh, Martin, Naylor, Abraham, and Reynolds. When the first edition of the Formulary was presented to the Conference at Manchester, acknowledgment was made of the eminent services of Messrs. Martindale and Naylor, and the volume had continued to meet with great appreciation. With regard to the Compendium, he asked what were the great reasons to which the President of the Pharmaceutical Society had referred. He had read all the discussions that had taken place in the Council which were published in the *Pharmaceutical Journal*. He had discussed the matter with Mr. Carteighe and his colleagues, and he had not been told the great reasons. Why there should be mystery and secrecy he did not know. When he was a little boy he was told that secrecy and guilt were very closely allied. It might be that those people felt a little guilty because they were going to publish this book. He had seen the title-page, and it bore the words "By Authority." By the authority of whom? These words are not used on the B.P. on the authority of the Pharmacopœia Committee, or of the General Medical Council, but by the statutory authority of the law of this land. That was the authority. When any man or group of men assumed to do things by authority, or

claimed to have qualifications which they had not by law, they were charlatans. He tried his best to ascertain from Mr. Carteighe what they were going to do. As far as he could gather, there was a period of very great excitement—men who were owners of proprietary medicines were liable to be taxed, and in their haste they appealed to the Pharmaceutical Council. Mr. Carteighe said they were in a blue funk. The Compendium scheme was launched on the Council, and accepted, and, as Dr. Symes said, in an hour they reversed the policy of sixty years. It was necessary for them to inquire into the qualifications of men who sought to do public work. He had, with that object, looked through the collected index of the *Year-Book*, and in some cases he had gone right through to the present day. He found that, up to the date of their appointment, the members of the Formulary Committee had published the following number of papers on pharmacy:—Mr. Greenish, 17; Mr. Groves, 20; Mr. Martindale, 8; Dr. Symes, 15; Mr. Thresh, 23; Mr. Martin, 1; Mr. Naylor, 11; Mr. Maben, 4; Mr. Abraham, 2; Mr. Reynolds, 9. Turning to the members of the Compendium Committee—the men who claimed the right to revise the work of the Formulary Committee—what did he find? He was sorry they were not all present. Mr. Atkins had published a paper on ethics, one on apprenticeship, and one in which he bewailed the fact that the public knew so little of the difference between a pharmaceutical chemist and a member of the Pharmaceutical Society. Mr. Carteighe published a paper in 1869 and one in 1871. As to Mr. Newsholme, he had searched the index carefully, and could not find that he had a single paper on pharmacy. They all knew that Mr. Newsholme was an authority on territorial representation, but they would not accept that as an indication of his supreme fitness to revise the work of men like Greenish, Martindale, Symes, and others. Mr. Carteighe had told them that time was of the utmost importance with regard to the book, which must be out on January 1. He asked them, as pharmaceutical chemists who had to carry on their work day by day, what had been their experience of the difficulties caused by changes in the Pharmacopœia? They had not yet got over the difficulty of the belladonna change. Could they imagine a pharmacopœia which was to rank with the British Pharmacopœia, published in haste this morning, and to-morrow morning it was discovered that a formula contained in it did not keep, and had to be changed? They had carefully prepared according

to the first formula, and then they had to make the alteration. In five years their prescription-books and their shelves would be in chaos. Whoever said "rubbish" had not had as much experience in pharmacy as he (the speaker) had. Amid a lot of rumour and hearsay, they were told that domestic medicines were to be published. Who wanted domestic medicines published "by authority"? A competent pharmacist did not, because he made his medicines a little better than other people, and he claimed to have an opportunity of making them himself. A public analyst might want them.

The PRESIDENT, intervening, said it was imperative that they should adjourn in five minutes.

Mr. MARTIN, in conclusion, said the President of the Society told them there were great reasons. He had watched very carefully for those reasons, and he was now canvassing the characters, so far as he knew them, of the men to whom they were asked to hand over the Formulary. He had come to the conclusion that the Pharmaceutical Conference had done the work well, and there were excellent reasons why it should quietly go on its own way.

The Conference then adjourned for luncheon.

AFTERNOON SESSION.

Mr. W. F. WELLS said he seconded the amendment because he was pretty well convinced that it was in the best interests of the Conference. From what he read in the journals he had come to this conclusion, but he had come to the Conference with an open mind, expecting that the proposer and seconder of the recommendation would give them some reason why they should adopt the recommendation, but they had not done so. On the contrary, he thought Mr. Martin had given a good deal of information as to why they should not. He did think the action of the British Pharmaceutical Society in this matter was peculiar. They had an opportunity years ago to publish this "Formulary," but declined to do so; they left it to the Conference to start the enterprise, and when they find that to some extent it had paid the Conference to do the work, they turn round and say, "With or without your leave we will do it." He thought this sort of thing was confined to the Emer-

ald Isle, but he did not expect to find it here. He humorously compared the Pharmaceutical Society to a big boy who politely asks a small boy for his marbles, and winds up his request with a threat to knock the breath out of him! The Representative of the British Society said, "Whether you will or whether you will not, we will take your property." He politely said, "You have nothing to sell; you have no property," although he had previously said they would take their property, and ended up by saying, "We will give you a present of seventy guineas." He hoped the Conference would have spirit enough to refuse the offer. If the Society meant business let them come to the Conference in a business manner—let it be a business transaction. If the Conference decided to accept the offer, let them do it in that way, that they were going to give something and that they were to get something for it. He noted in the remarks of the respected President of the Pharmaceutical Society of Great Britain some reference that would lead one to think it was this Conference which first approached the Society. He thought it only fair that it should be understood the reason this was done was that they had been told that whether they would or not the Society would take their property. Some members began to get anxious—he did not know why. They had a "Martindale" and a "Squire" before, and yet in spite of these two books their "Formulary" had taken on and was selling. He thought they ought to have some formulæ, and he thought they should be issued by a society like this, which is not the representative of British pharmacy, but of the Greater Britain pharmacy. In the city from which he came they were in the happy position that no medical man would think of dispensing, and it was his view that the Conference should publish the "Formulary" as the representative of Greater Britain, and that they as pharmacists should take this book up and make greater use of it than they had in the past. He need not remind them that prescription-writing had been undergoing a great change in the past few years. Medical men used to receive a training in pharmacy. The majority of the younger medical men were not now so trained, and would not in the future write prescriptions. The Americans as a consequence were sending over missionaries to convert the heathen. They should have a "Formulary" published by this Conference and they as individual pharmacists should go to their medical men and ask them to use the "Formulary." They would be able to assure them

that they would get freshly-made prescriptions and new drugs. He thought it was the right of this Conference to hold on to their position. Had there been any reason shown why they should give it up ? He did not think there had.

Mr. GLYN-JONES was a little surprised that some reluctance had been shown to discuss this matter. He thought, when a change of this kind was proposed, the onus of showing the necessity for the change was thrown upon the proposers, and he had expected that some arguments would have been brought forward in support of the resolution. They were told that the Executive had had this matter before them for many months ; yet the Executive met the previous day, and, as the result of their deliberation, they came before the Conference that day and had not dared to propose that they should sell this Formulary. That was his point. The Executive Committee of that Conference were not satisfied that they would be justified in recommending the Conference to sell the Formulary. Of course, somebody had got to propose it, and his friend the Treasurer moved it in a very diffident manner, and had to be coaxed into saying anything at all.

The PRESIDENT said the resolution was not carried by the Executive Committee because it was ruled that it was not a matter for the Executive, but for the Conference.

Mr. GLYN-JONES said he thought it was right to call attention to the fact that the Executive Committee had not felt itself in a position to recommend the sale of the Formulary. He also referred to Mr. Bird's diffidence in saying anything when seconding the resolution. Both the proposer and the seconder seemed to take up the position that the big people at Bloomsbury Square were going to swamp the Formulary, and this was the best way out of the difficulty. He then referred to the delicate way in which the President of the Pharmaceutical Society had paved the way by very cleverly suggesting that it was a question of loyalty to the Society. He wished them to get rid of that idea of loyalty to the Society, because he believed that in times past the question of loyalty had been pressed to the disadvantage of the Society. No one would accuse him of disloyalty to the Society, and he did not think that persons should come there and raise the question of loyalty or disloyalty. As the Executive Committee had said, the Pharmaceutical Council had not recognised that they had any property to sell. This had been put very clearly by Mr. Carteighe, and it was suggested that an

honorarium should be paid. He did not understand quite what was meant by an honorarium in this case. If anything was given for something, he called that a price, and if the Conference accepted seventy guineas, whether they called it an honorarium of not, they were selling their property to the Pharmaceutical Society. He asked the Executive Committee that morning to tell them whether they had taken any advice on this matter. He considered they had got a very valuable property in the Formulary, but he was told that it was all very well to talk about property, for if the Pharmaceutical Society produced a Compendium there would be no sale for the Formulary. He thought it would be invidious to compare those who had the preparing of the Formulary with those who were members of the Compendium Committee, but he did say that they would not be able to produce a Compendium without the active support of the prominent members of the Conference. He knew something about the inception of this Compendium and he asked any gentleman in that room whether he had heard of a demand for the Compendium to be published by the Pharmaceutical Society. He would ask any of his colleagues who were members of the Council, who should speak later, whether they could tell them of the scope of the Compendium. Those gentlemen would tell them that they had no information. No one, with the exception of Mr. Carteighe, and perhaps one or two of the officials of the Pharmaceutical Society, knew anything about the scope of the Compendium, and he thought they were entitled to the information. If any one had said last August that there was going to be an offer to buy the Formulary by the Pharmaceutical Society, they would have been laughed at. They knew that the Inland Revenue took certain action, and that some steps were taken by the Editor of the *Pharmaceutical Journal* —and all praise was due to him for it—to meet the requirements of the case. Mr. Carteighe, in August last, moved that a book be produced, which was to be ready by last January, to meet the requirements of the Medicine Stamp Act. Dr. Symes had said that seventeen out of twenty-one members of the Council voted in favour of the Compendium. But that was for the book that the Pharmaceutical Society did not dare to stamp with its authority. He maintained that the Pharmaceutical Society did not dare to put its stamp upon many of the formulæ in that publication, and it was published as part of the Journal publications. At that time no one knew that the Pharmaceutical

Society were in any way going to produce a book that would clash with the Formulary of the Conference, and, as a member of the Council, he was rather ashamed that the question of compensation for interfering with the Formulary had had to come from the Conference. He maintained that when the Conference years ago decided, in their wisdom, to publish a Formulary, they built better than they knew, and there was a danger now that they were going to have two books published "by authority." He knew some of the difficulties of having one book published "by authority," and had seen chemists and druggists dragged into the Courts under the Sale of Food and Drugs Acts because certain preparations were mentioned in the British Pharmacopœia. There was a danger of two books being published "by authority," and recognised as standards under the Food and Drugs Acts. Mr. Glyn-Jones then went on to refer to the efforts that had been made by Mr. Hills and Mr. Beggs to get some recognition from the General Medical Council of the work done by pharmacists in connexion with the British Pharmacopœia. They had succeeded in getting a better position than ever before. He thought this question should be most carefully considered from every point of view. He thought the Pharmaceutical Council should accede to the reasonable request of the workers on the Formulary, that they should be taken into the confidence of the Council before the Conference sold them the work now in the hands of the Formulary Committee.

The PRESIDENT said there were no standing orders of the Conference, but he must express the opinion that to discuss the business of the Pharmaceutical Council was not quite in order. Before proceeding further he thought an explanation was due to the Conference as to his position in the matter, and an explanation was also due to his friend Mr. Robinson as to how he got into that position. With that object in view, therefore, he should ask Mr. Peck, as a member of the Executive Committee, to make a statement.

Mr. E. SAVILLE PECK said it would be remembered that the Executive's letter of May 25 had not been answered when a meeting was held on June 24, and Mr. Idris, who was in the chair, offered, at the end of the meeting, to see the President of the Pharmaceutical Society, and endeavour, in a friendly way, to get an answer to the letter; also to see if some amicable arrangement could be arrived at. He admitted that at that Executive meeting a definite resolution was not drafted, but there certainly

was approval, and at the meeting on June 24 the members of the Executive considered they were doing quite right, and they certainly thought that they had the support of the Chairman of the Formulary Committee. Their reason for thinking so was a letter dated May 16, on the eve of the annual meeting of the Pharmaceutical Society this year. He had written to Mr. Martin for papers for the Conference, and in reply he received the letter mentioned. Mr. Martin said in that letter that he was afraid it would not be possible for him to read a paper at the Sheffield meeting, and expressed sorrow at not being able to attend the meeting of the Executive. He went on to say that Mr. Carteighe, acting, he presumed, on behalf of the Pharmaceutical Society, had announced his intention of publishing a Compendium, and Mr. Martin said: "Of course, the Conference cannot prevent him. Most of my colleagues on the Committee—the Formulary Committee—think it wise to make a financial bargain with the Society, and I do not wish to oppose it, although my personal view would be for the Conference to stand aloof and see what the Pharmaceutical Society will do in the matter." Continuing, Mr. Peck said, as Secretary of the Conference Executive, he had always tried to work with Mr. Martin, and with the Committee, and on July 25 he sent to Mr. Martin, as Chairman of the Formulary Committee, Mr. Bremridge's letter offering the seventy guineas. Mr. Martin replied, thanking him for sending on the letter, and said he presumed Mr. Peck had sent it to him in his capacity as Chairman of the Formulary Committee. Mr. Martin went on to say: "I think the offer a reasonable one, and that if it is passed by the Council of the Society in time to come before the Conference in an official manner I see no reason for rejecting it. In order that there may be no hitch, and as it is impossible for me to have a meeting of the Committee before the Council meeting, I am writing each member of the Committee for his opinion and I will let you have the replies in time for the August meeting." Mr. Martin wrote to Mr. Peck on the subject as late as August 1, and he (Mr. Peck) was reading the letters to show that the Conference Executive Committee had given every consideration to the matter. The letter reads: "I propose to wait till after the Council meeting this week, when, if the offer of seventy guineas is confirmed, and the offer be in a shape that we can accept, the report of the Committee could be approved, and conclude probably with a recommendation to accept it. All

being well, I hope to be present." He (Mr. Peck) thought that, in view of those letters, the Executive had been justified in going along the lines it had done.

Mr. EDMUND WHITE supplemented Mr. Peck's remarks, and pointed out that the Formulary Committee was appointed by the Conference and not by the Executive. Therefore the doings of the Formulary Committee could not be dealt with by the Executive, and matters affecting the Formulary Committee, chiefly, must be left to be dealt with by the Conference as a whole. He made that statement because he felt that Mr. Glyn-Jones' remarks somewhat reflected on the Executive.

Mr. MARTIN said he thought the letters which had been read were exceedingly interesting, and that they entirely corresponded with what he had said that day. He had not suggested that the President of the Conference had not done his best to deal, as he thought, wisely with the matter. With reference to Mr. White's remarks about the Executive, his advice to the Executive Committee was that the Formulary Committee was ready to publish the Formulary, and that if they were put to the expense of £60 or £80 for printing, he thought the Executive might reasonably complain of the Formulary Committee putting them to that expense. He should like to bear his testimony to the exceeding pains that the President of the Conference and the President of the Pharmaceutical Society had taken to bring the matter to a reasonable conclusion.

The PRESIDENT thanked Mr. Martin for his reference to himself, but he thought the Conference would conclude from the letters which had been read, and from the opinion expressed by every member of the Committee, that he was justified in thinking it desirable to approach Mr. Robinson with a view to hurrying up a reply from the Pharmaceutical Society. In the circumstances, he felt that he owed a strong apology to Mr. Robinson. The President then read a letter he had received from Mr. Robinson as President of the Pharmaceutical Society with respect to the honorarium, and went on to say that from the very beginning the members of the Executive had felt that it was no business of theirs to discuss the business of the Pharmaceutical Society. The Pharmaceutical Council had—rightly or wrongly—come to the full determination of publishing the Compendium, and it was felt that there should not be the slightest antagonism between the two bodies. His friend Mr. Martin would excuse a mild protest against his reference to the qualifications of the

members of the Pharmaceutical Council to be on the Compendium Committee—surely the number of papers read at the Conference should not be considered an all-round standard for pharmacists. He hoped the Conference would consider that he was justified in doing what he had done, and what he thought was best in the circumstances.

Mr. JOHN HUMPHREY, speaking as a member of the Conference, with full information on the subject, said he did not propose to take any part in the discussion with a view to influencing the decision of the Conference as to whether it should dispose of the Formulary or not. But he supposed he was the only person in Sheffield who knew all about the matter under consideration from the beginning. He had been in the confidence of Mr. Carteighe in regard to the Compendium, and had attended every meeting of the Compendium Committee, as well as the meetings between members of the Conference and members of the Compendium Committee. Moreover, he had conversed with Mr. Carteighe on the subject quite recently, and he was in a position to say that from the very outset Mr. Carteighe had no intention of interfering in any way with the work of the Formulary Committee. Knowing what was to be the scope of the Compendium, his own view was that the work would not in any way have interfered with the Formulary for some time to come, if at all, and he thought the Formulary Committee had been very foolish in not producing the edition which the Chairman of the Formulary Committee said was nearly ready for publication, early in the present year. The Formulary Committee might have produced the book and have sold most of the copies by this time, and he doubted whether even later editions would have been interfered with by the Compendium. As was well known, the works of Squire and Martindale included every formula in the B.P.C. Formulary, and yet had not interfered with its sale: and even if every formula had also been included in the Compendium he did not think that would have interfered with the sale of the Formulary. He knew that Mr. Carteighe's idea was that there was no reason whatever why the Formulary Committee should not continue its labours and continue to publish the Formulary. He might add that the Compendium Committee was not anxious to purchase the Formulary, nor to spend this money; in fact, it was really felt that the Conference had not got anything to sell in the Formulary. Whether the Formulary was purchased or not the scope of the Compendium would not

be affected, but, if the Conference decided not to accept the seventy guineas, he was afraid it would lose something. He believed the first suggestion that the Conference should receive any money from the Society came from certain members of the Conference, and he even had an impression that Mr. Martin made the suggestion to Mr. Carteighe.

Mr. MARTIN said he had no recollection of making any such suggestion.

Mr. HUMPHREY, continuing, said the Compendium Committee looked upon the production of the Compendium as a business enterprise, and, like business men, the members of the Committee did not propose to give away their secrets. When the book was published its scope would be known to everyone but not before. The idea of paying money to the Conference in respect of a problematic loss undoubtedly came from members of the Conference in the first place. He was positive about that, because the question of pecuniary recompense was raised in conversations he had held with Mr. Martin, Dr. Symes, and others. When reference was first made to the problematic loss, Mr. Carteighe said: "What do you propose? Is it money you want?" The reply was "Yes," and the Treasurer said the funds of the Conference were in a bad state——

The PRESIDENT: All the information the Executive has is that the suggestion came from the Pharmaceutical Council.

Mr. ALCOCK: May I ask where the suggestion of seventy guineas came from?

Mr. HUMPHREY said there was, unfortunately, no documentary evidence on that point, but the impression on his mind was very strong that certain members of the Conference Executive suggested to Mr. Carteighe the payment of some recompense for any damage the Formulary might sustain. How the estimate of seventy guineas was arrived at he did not know.

The PRESIDENT: I can explain that.

Mr. HUMPHREY, in conclusion, said he wished to emphasize the fact that the Compendium Committee did not wish to buy the Formulary, nor was it thought that the Conference had anything to sell. The payment of seventy guineas had been agreed to as an act of grace, and not as payment for anything to be received.

Mr. F. H. ALCOCK said members seemed to be talking about something they did not understand. They were talking about seventy guineas, but they knew nothing about the origin of the

seventy guineas. What was it for? Some said it was an honorarium; some said it was a payment for something: while others said it was for nothing. He did not think he had ever attended a Conference where they were in such a muddle —they did not seem to know anything about the matter.

The PRESIDENT said he was informed that the question of recompense, or the first mention of any payment, came from the mouth of Mr. Carteighe, who suggested £75, and in consequence he and Mr. Robinson "split the difference" and decided on seventy guineas.

Mr. GLYN-JONES asked if the acceptance of the seventy guineas meant that the Conference disposed of its rights in the Formulary to the Pharmaceutical Society?

The PRESIDENT: There is not the slightest doubt that if we accept the offer we do dispose of our rights in the Formulary.

Mr. G. T. W. NEWSHOLME agreed with some of the previous speakers that this was a matter of business. It was a question whether the Conference was to receive seventy guineas or nothing. He thought the Conference had wasted a good deal of valuable time. He did not wish to quarrel with his friend Mr. Martin, who had spoken out strongly. He had something like twenty years' friendship with Mr. Martin. He had the pleasure of sitting on the Council of the Pharmaceutical Society with him and he had known him since—he was the same Mr. Martin now as he was then; he had his own way of doing things. He (Mr. Newsholme) was not going to defend the Compendium. He was a member of the Compendium Committee, and was one of those members who had not written a single paper—he was not ashamed to own it, for he was in good company with their distinguished past-President, Mr. Atkins. It seemed to him he was not in a very much worse position than Mr. Martin, who acknowledged to one paper only.

Mr. MARTIN: Up to a certain date—1886.

Mr. NEWSHOLME, continuing, said he had never written a pharmaceutical paper in his life, and he was quite willing to give Mr. Martin credit for being a distinguished pharmacist, and for having done a good deal for pharmacy. But he thought Mr. Martin had taken up a very wrong position, and he thought when he heard Mr. Martin's letters read there was nothing more to say, because, as they said in Yorkshire, he had "given the whole show away." The Pharmaceutical Council had decided to publish a Compendium, and they meant to carry out their

decision. He might remind the Conference that the Compendium Committee was not going to take the place of prominent pharmaceutical workers—the members of the Committee would act as an executive, and would organize the workers, not do the work themselves. Therefore, he hoped Mr. Martin would not be too hard on the members of the Compendium Committee because they had not written any pharmaceutical papers. The object of the Committee was to produce a book which would be of some value to pharmacy. A great deal had been said about the work of the Formulary Committee. He appreciated the work of the Formulary Committee, but he maintained that the Council of the Pharmaceutical Society was the proper body to publish a work which should be a national work. The Conference could not give to the work the character which the Pharmaceutical Society was able to do. Such a work as the Compendium had been needed for years. They had "Squire" and "Martindale," and other great books of the kind, but there was a need for a book of the character of the proposed Compendium which would be recognised by the medical men of the country. He hoped the Conference would realize that the matter before it was a question of accepting seventy guineas or refusing it. It would not make a bit of difference to the Pharmaceutical Society: the Compendium would be published. That being the case was it worth while for the Conference to carry on a book such as the Formulary?

Mr. Alcock asked if the Formulary could not be copyrighted, so as to prevent others taking its formulæ?

Mr. Bird: It is copyright now.

Mr. Newsholme, continuing, said it had been stated that the Compendium Committee was getting nothing for the seventy guineas. He did not wish to associate himself with that statement. They were getting something—they were going to get the help of a number of pharmaceutical workers.

Mr. J. F. Tocher supported the amendment, and said that members should clear their minds of personal differences and apply themselves to the questions at issue. He had listened to both sides, and was not convinced that the Conference ought to part with this valuable property. He thought Mr. Humphrey had given the case for the motion absolutely away. He was not surprised to hear that he alone was in the confidence of Mr. Carteighe, but he was surprised that, after a responsible councillor like Mr. Glyn-Jones had to confess he did not know what the

Compendium was to be, he (Mr. Humphrey) should get up and say that he was the only man in Sheffield who knew all about it. He was also astonished at Dr. Symes' attitude, seeing that he thought the Conference was more suited to do this kind of work. He was afraid that Dr. Symes was sitting between two stools, and in that connexion he quoted the following lines :—

> A Solomon may practise all his wit upon
> Dame Nature's mysteries, yet fail to hit upon
> A plan whereby securely he may sit upon
> Two stools.

Continuing, Mr. Tocher said it had been stated that there was absolutely no use at all for the Formulary, seeing that there was to be a Compendium ; but what about Squire's *Companion* ? What about " Martindale ? " What about White and Humphrey's *Pharmacopedia* ? He went on to express the hope that the matter would not be decided on racial lines—he noticed that on one side were Irishmen, Welshmen, and Scotsmen, while many Englishmen who had spoken had been on the other side. He hoped the matter would be decided fairly and squarely, and that the Conference would not give away its rights until each member had got a notice from the Executive Committee to attend a meeting of the Conference to discuss the matter, because he contended that it was not competent to discuss the matter until each member of the Conference had had a formal notice from the two secretaries.

The PRESIDENT said he must rule that the annual meeting of the Conference was entitled to deal with any business that was brought forward.

Mr. CONYNGHAM expressed great surprise at what he had heard that day. He thought the matter could be summed up in a few words—that the Conference was asked to sell its liberty, for time and for eternity, for seventy guineas. He thought the rising generation of pharmacists should not be bound so, but that the Conference should reserve its rights.

Mr. H. WIPPELL GADD spoke in favour of the amendment, though he did not endorse all that had been said in support of it. He was a loyal supporter of the Pharmaceutical Society, but he did not think the Council had a mandate from its constituents to produce a Compendium.

Mr. J. RYMER YOUNG (Vice-President of the Pharmaceutical Society) supported the motion. After referring to Mr. Martin's remarks, he paid a tribute to the forty-one years' service which

pharmacists had had from the Conference, and said he did not close his eyes for a moment to the good work done by the Formulary Committee: but, after all, the Conference was not the Alpha and Omega of all progress in pharmacy. With reference to the question of a mandate, he claimed that when a majority of seventeen to four members of the Pharmaceutical Council decided to embark out of the ordinary lines, the Council was perfectly right to do so. The charge which was usually brought against the Pharmaceutical Society was that it did not depart sufficiently from its old methods. Now that it had produced a book which had proved a great success, and was proposing to produce another book, but on rather different lines, there was all this cold water thrown upon it. He urged the Conference to consider the matter from a business point of view, and to remember that the Compendium was going to be brought out even if the Conference declined to part with its formulæ.

Mr. R. A. Robinson said he had been in doubt whether to take any part in the discussion, but the reference to the correspondence with Mr. Martin had reminded him that he also had received a letter from Mr. Martin on the subject.

Mr. Martin mentioned that the letter referred to was marked "Private."

Mr. Robinson said he had overlooked the word "Private," but he might say that there was no indication in the letter that Mr. Martin was going to take the line he had done. The Pharmaceutical Society had no wish to press seventy guineas into the reluctant hands of the Conference if the members did not want it.. As to the origin of the suggestion, his recollection of the matter was that the members of the Conference when they heard of the proposed Compendium suggested that something ought to be given for their book, and he said that if the Compendium was going to interfere with the work of the Formulary Committee, it was only right and proper that the Pharmaceutical Society should make the Conference some payment or honorarium. He believed Mr. Martin had the same thing in mind, that it would be advisable to accept a sum of money, as it would be impracticable to continue with the Formulary. He was speaking as a member of the Conference of twenty-five years' standing, and he thought they had to consider which was the best policy to pursue. Mr. Robinson went on to say that the Formulary had not been sufficiently known in the past, and he asked the members of the Conference to consider whether it

would be wise to continue to publish it in view of the fact that the Pharmaceutical Society had decided to produce a more substantial book. Referring to the character of the proposed Compendium, Mr. Robinson said it was to be a book which would be of use to the dispensing chemist and to the physician —a book which would help the retail pharmacist to prepare his own medicines, and a book such as would encourage the medical man to prescribe medicines instead of proprietary tablets and such-like preparations. With regard to Mr. Martin's remarks as to the qualifications of the members of the Compendium Committee to do pharmaceutical work, he said Mr. Martin was absurdly and ridiculously unfair. Who was going to do the work on the Compendium ? Had any one ever heard of Professor Greenish ? Was he a good pharmacist ? Or did any one know Mr. Edmund White, a member of the Compendium sub-Committee, and an officer of the Conference ? With regard to the apology of the President, he fully understood the *bona fides* on which he acted, and members of the Conference would understand the *bona fides* on which he (Mr. Robinson) had acted. It had been said that there would be no friction and no difficulty in the matter of coming to an amicable agreement, and when he and the President met they came to an arrangement in about five minutes. And he might say that they met at a garden party at the Botanical Gardens, and instead of going to be presented to the Prince and Princess of Wales they decided to discuss the much more important matter of the Formulary. They decided that seventy guineas was a just and generous amount, and they felt sure that the Conference would feel the same. He appealed to the members of the Conference to consider whether they would go back on what their officers had done or accept the offer of the Pharmaceutical Society.

Dr. Symes, in speaking to the amendment, explained that when the Council decided to produce the Compendium he was not present, and at the next meeting of the Council he raised the question as to how far it would interfere with the Formulary. He then suggested that if it did interfere with the Formulary it was only right and just that some compensation should be given to the Conference, and this was the first time that the question of recompense was raised. Referring to the letters of Mr. Martin. Dr. Symes said they clearly showed that he was not unwilling for the matter to be carried through up to the time of the meeting. When he listened to Mr. Glyn-

Jones's remarks he thought what a pity it was that his speech was not made in a law court with a retaining fee. He thought the publication of the Compendium, if it was what he now hoped it would be, would do a great deal to bring about a better understanding between the General Medical Council and the Pharmaceutical Society in regard to the British Pharmacopœia. He believed it would be a useful book not only to pharmacists, but also to medical men. The General Medical Council was dealing very high-handedly with the Pharmaceutical Society in regard to the Pharmacopœia, and he did think the publication of the Compendium would be a means of bringing the General Medical Council to see the advantage of having a hybrid committee to produce the national Pharmacopœia in future.

Mr. W. A. H. Naylor said he had listened with the greatest possible diffidence and interest to the speeches which had been made that day, and he did not know that he could say anything which would be considered in the nature of a valuable contribution to what had been already so well said, both on one side and on the other. He might say, therefore, at once that he intended to vote in favour of the motion. And he would say exactly why. The reason was this: being a member of the Executive Committee, he had at least on two occasions held up his hand in favour of a resolution, which was carried, going forward to the Council of the Pharmaceutical Society asking the Society what offer it would make. Now, he was bound, he thought, in honour bound, to support that day the motion. In common with others, he attended as delegate a meeting to which they were invited informally, and in common with others did his best as a member of the Executive Committee, as a member of the Formulary Committee, to extract from the Chairman of the Compendium Committee some idea of the nature and scope of the Compendium. They did not know, and they could not obtain any information at the time, for the simple reason, and a very sufficient reason, that the Chairman of the Compendium Committee was not quite certain what would go into the book. Moreover, he was not quite certain whether it would be a pharmacist's pharmacopœia, or whether it would be a pharmacopœia suitable for medical men, or for both. Therefore, they found that in the absence of any certain definite knowledge it was useless to press for definite information. He thought that if those who had spoken that day had attended the meetings between the Conference and the Compendium Committee they would have been struck by

one thing, and that was the intention of the Compendium Committee to make the Compendium a worthy volume, a worthy representative of medicine and pharmacy, and that it would be an enlargement on the Formulary which the Conference had published from time to time. Further, it would have the distinct advantage of having as workers, in connexion with the perfecting of the formulæ, the same gentlemen who for years had been members of the Formulary Committee. The Compendium would be produced at a proportionately cheaper rate—he was not disclosing any confidences—but the book would be produced at a proportionately cheaper rate than the Conference could afford to produce the Formulary. He thought, therefore, that with those advantages—and they were advantages—they did not want to multiply these books of formulæ—in fact, they were becoming a nuisance. If gentlemen of the Conference had the misfortune to belong to a wholesale business, he was sure they would vote for the motion.

The amendment was then put, twenty-one voting for it, and forty-three against.

The original motion was next put to the meeting and carried by a majority of forty-one to nineteen.

The reading of papers communicated to the Conference was then proceeded with.

NOTE ON STANDARDIZED POWDERED ALCOHOLIC EXTRACTS.

By E. H. Farr and R. Wright,

Pharmaceutical Chemists.

(1) Extract of Hyoscyamus.

For several years past we have had the subject of alcoholic extracts under consideration, and in 1897 we contributed a note on the subject to an evening meeting of the Pharmaceutical Society.[1] In a further note, communicated by one of us (Wright) to the Dundee meeting of this Conference, attention was again drawn to the subject, and the opinion was expressed that the time had come for an attempt to be made, on the basis of facts

[1] *Pharm. Journ.* [4], **5**, 517.

and figures already available, to work out a scheme for the standardization of some, at least, of these extracts.[1] The present note is the outcome of experiments carried out with this end in view, and may be taken as a preliminary to further work on the subject.

It cannot, we think, be claimed that prior work on standardized extracts has resulted in conspicuous success, or that those of the official extracts which are already standardized can be regarded in the light of satisfactory pharmaceutical preparations. In the case of the extracts of belladonna root and nux vomica, this is doubtless due largely to the fact of their preparation from a previously standardized liquid extract, in which the proportion of alkaloid and extractive has been shown to vary within very wide limits. The chief cause of the failure lies, however, in the attempt to retain for the standardized product the character of a semi-solid or solid extract, the result being that commercial samples of the same extract sent out by different manufacturers exhibit considerable variation, both in appearance and consistence.

A long and critical examination of the question in all its bearings has convinced us that this is the root of the difficulty, and that the only satisfactory solution of the problem lies in the direction of powdered extracts. Any one who has had practical experience in the manufacture of alcoholic extracts will have noticed the troublesome stickiness which many of them exhibit after being kept for a short time, and which is caused by the tendency of these extracts to absorb moisture. This applies more particularly to the alcoholic, as distinguished from hydro-alcoholic extracts, though many of the latter often show a similar tendency. Our first proposition is, therefore, that extracts of this description, when intended for use in making pills, shall be carefully desiccated and the moisture replaced by a powder of some kind; the resulting product being preserved in a pulverulent form by enclosure in suitable containers. Certain exceptions have to be made, as in the case of extracts containing volatile principles of a more or less active nature, e.g., chamomile; also in cases where the galenical approximates closely to the character of a resin or mixture of resins, or partakes of an oleo-resinous character, e.g., the extracts of Indian hemp and jalap, or where the chief use of the preparation is as a pill excipient or an ingredient in some liquid galenical, e.g.,

[1] *Year-Book of Pharmacy*, **1902**, page 499, *et seq.*

gentian and liquorice. These, with the addition of ergot, constitute all the official extracts which do not lend themselves readily to treatment along the lines indicated above.

In the case of extracts containing alkaloids, the principle to be followed is to make a liquid extract or tincture of the drug, determine the alkaloids in a small portion of this, recover the alcohol, dry the extract, at first over a water-bath and subsequently in a hot-air oven at a temperature of 60° to 70°C., take the weight of the resulting extract when cold, and mix thoroughly by trituration with a sufficient quantity of a suitable powder to bring the extract down to the required standard. The product is then passed through a No. 20 sieve, and finally enclosed in a well-corked or glass-stoppered wide-mouthed bottle. Of the several powders which have been proposed for use as diluents, we prefer a vegetable powder of No. 40 or No. 60 degrees of fineness, and preferably the powdered drug from which the extract has been prepared. The advantage presented by a powder of this character is that it is sufficiently absorbent to prevent the solidification of the extract, while a secondary advantage consists in the fact that by its use the identity of the preparation is, as far as possible, preserved. The powder employed as a diluent should be dried at a low temperature before use, and the alkaloid (if it contain such) determined.

Having laid down the general pinciples which, in our judgment, should be followed, it remains to record the figures which have helped us in the fixing of the standard, and to give a detailed account of the experiments recently made with the same object. A reference to the literature of hyoscyamus shows that some of the alkaloidal percentages recorded by foreign workers are so much higher than any obtained by workers in this country as to make it certain either that (1) the results obtained are inaccurate, or (2) some other variety of the drug has been employed, or (3) the alkaloidal content of the plants grown in some foreign countries is considerably higher than that of the indigenous drug. Thus, E. Schmidt found 0·365 per cent. alkaloid in the stalks, and 0·286 per cent. in the leaves.[1] L. Dohme gives 0·173 for the leaves.[2] On the contrary, Beckurt's figures[3] are 0·089 (average of four samples), which closely coincides with the percentages recorded by workers in this country. A. W.

[1] *Pharm. Journ.* [4], **10,** 22.
[2] *Am. Journ. Pharm.*, **1893,** p. 479.
[3] *Pharm. Journ.* [4], **16,** pp. 267 and 425.

Gerrard found in biennial leaves from plants grown in different parts of this country an average of 0·06 to 0·07 per cent., and for the tops 0·045 per cent.[1] Messrs. Parke, Davis & Co. have supplied us with the results obtained in their laboratory, showing a maximum of 0·13 and a minimum of 0·073. (This is for English-grown plants.) J. C. Umney gives 0·07 to 0·1, with an average of 0·08, and proposes a standard of 0·08.

Our figures for commercial samples of the official drug, examined during the past few years, are as follow (expressed in percentages) :—

1 = 0·064	9 = 0·088	
2 = 0·068	10 = 0·088	
3 = 0·072	11 = 0·090	
4 = 0·078	12 = 0·094	Maximum = 0·120 per cent.
5 = 0·080	13 = 0·096	Minimum = 0·064 per cent.
6 = 0·080	14 = 0·106	Average = 0·088 per cent.
7 = 0·080	15 = 0·116	
8 = 0·084	16 = 0·120	

The results obtained by different workers in this country are, therefore, very closely concordant.

What should be the alkaloidal strength of the official extract of hyoscyamus ? If we take as approximately accurate the figures quoted in Squire's *Companion*, 15 lb. dried leaf represent 100 lb. fresh leaf, and if so, an average of 0·09 per cent. alkaloid in the former would equal 0·0135 in the latter. According to Squire,[2] 100 lb. fresh leaves (with flowering tops and young branches) yield 5 lb. extract, so that, assuming the whole of the alkaloid present to come away in the expressed juice, the maximum average alkaloidal content of the official extract would be 0·27 per cent. In all probability, however, some loss of alkaloid does occur, and the average will consequently be lower than this. Most of the published figures refer to alcoholic extracts, and do not touch the question in hand. A sample of juice-extract sent to one of us in 1896 by Mr. W. G. Cross, of Shrewsbury, gave 0·15 per cent. alkaloid. Six samples examined by us in 1897 [3] gave a maximum of 0·18 and a minimum of 0·13, with an average of 0·15. On the contrary, Naylor and Bryant obtained a much larger yield, nine samples giving an average of 0·24, with a maximum of 0·43 and a minimum of 0·14.[4]

[1] *Year-Book of Pharmacy*, **1890,** p. 347.
[2] *Companion to the British Pharmacopœia*, ed. xvii., p. 361.
[3] *Year-Book of Pharmacy*, **1898,** p. 210.
[4] *Year-Book of Pharmacy*, **1898,** p. 362.

Coming to alcoholic extracts, it may be expected that the proportion of alkaloid will be higher than in the juice extract and that the stronger the alcoholic menstruum the higher the proportion of alkaloid in the finished extract, and such, in fact, is the case. Two extracts prepared by us with a 70 per cent. alcohol in 1897 gave an average of 0·23 per cent. alkaloid in the soft extract, or 0·30 per cent. in the dry. Another sample prepared by one of us in 1901, with a 45 per cent. menstruum, showed 0·25 per cent. alkaloid in the soft extract.

In deciding upon the standard to be proposed for the powdered extract, we have been guided partly by the alkaloidal strength of the official extract, partly by calculation from results already recorded by us, and partly by experiments carried out for the purposes of this note. La Wall, some years ago, proposed the adoption of a standard of 0·9 per cent., and we have been informed by a firm of wholesale manufacturers that they work to a standard of 0·5 per cent. total alkaloid. Whilst we admit the possibility of producing an extract of the above strength by working under special conditions, we think it would be unwise to fix an official standard so high. Some years ago we published a number of figures showing the ratio of alkaloid to extract dried at 100°C., when working under conditions such as ensured the complete exhaustion of the drug. Twelve samples were operated upon, and alcohol of 40, 50, 60, 70, and 80 per cent. strength was employed for the extraction of the drug. The percentage of alkaloid in the dry extracts is shown below :–

Menstruum.	Alkaloid.
40 per cent.	0·292
50 per cent.	0·277
60 per cent.	0·292
70 per cent.	0·320
80 per cent.	0·358

It will be noticed that the proportion of alkaloid in the dry extract is highest in those prepared with the stronger menstrua.

In 1893 we published another set of figures showing the results obtained when working upon other samples of drugs with 60 per cent. menstruum. The quantity of alkaloid in the dry extract from a 1 in 1 preparation was (1) 0·38 per cent., and (2) 0·32 per cent. When complete exhaustion of the drug had been effected, the amount dropped to (1) 0·334, and (2) 0·256

per cent. These figures illustrate the difficulty which would be experienced in working up to a standard of 0·5 per cent. A few supplementary experiments were next made with some dried leaves from English plants, season 1903.

(*a*) A portion of this, in No. 60 powder, was treated by Bird's process for the assay of belladonna leaves,[1] and gave 0·09 per cent. alkaloid. The process in question gives quite satisfactory results, 10 Gm. of the powder being taken for the assay. It is necessary to increase the volume of the solvent from 25 c.c. to 35 or 40 c.c., and also to vary the quantity of potassic carbonate solution used to moisten the powder, otherwise it is apt to form a clot. We also found it more satisfactory to repeat the final extraction of the alkaloid with acidulated water, and recovery by means of chloroform. This lengthens the process somewhat, but a purer alkaloid is obtained, and the gravimetric and volumetric results show a closer correspondence. The same process may be employed for the assay of the powdered extract.

400 Gm. of the above sample in No. 20 powder was then moistened with menstruum, divided equally between four conical percolators, and percolated with alcohol of 90, 80, 70, and 60 per cent. strength respectively, until 400 c.c. percolate had been collected from each percolator. These percolates were set aside, and percolation continued until 100 c.c. more had been collected in each case. The weak percolates were assayed, and gave the following percentages of dry extract and alkaloid :—

Menstruum.	90 per cent.	80 per cent.	70 per cent.	60 per cent.
Alkaloid . .	0·003	traces	traces	traces
Dry Extract . .	1·07 w/v	0·89 w/v	1·04 w/v	1·03 w/v

These figures show that exhaustion was practically complete, except in the case of the 90 per cent. percolate.

From the strong percolates the yield was as follows :—

Menstruum.	90 per cent.	80 per cent.	70 per cent.	60 per cent.
Alkaloid . . .	0·0114	0·0196	0·022	0·0154
Dry Extract . .	2·92	6·09	6·45	7·05
Percentage of Alkaloid in Dry Extract .	0·39	0·32	0·34	0·22

[1] *Pharm. Journ.*, **65**, 196.

The method employed for the determination of the alkaloid in these tinctures was a modification of the official assay process for liquid extract of belladonna. The proportion of alkaloid in the dry extracts was lower than had been anticipated, and a second experiment was made with a fresh sample of drug, in order to ascertain if the proportion would be higher in an extract from a more concentrated percolate.

(*b*) By Bird's assay process this gave 0·106 per cent. alkaloid. 200 Gm. of the drug in No. 20 powder was slightly damped with 70 per cent. alcohol, divided equally between two percolators, and a 1 in 1 fluid extract prepared by re-percolation. This gave 19·7 per cent. dry extract, and 0·0788 per cent. alkaloid. The proportion of alkaloid in the dry extract is therefore 0·40 per cent.

(*c*) This sample was treated like the previous one. By Bird's assay process it gave 0·094 per cent. alkaloid. A 1 in 1 fluid extract gave 23·9 per cent. dry extract w/v and 0·066 Gm. alkaloid. The proportion of alkaloid in the dry extract was therefore 0·276 per cent. On the basis of the facts and figures above given, we submit the following process for a powdered extract, subject to any modification which experience may show to be necessary :—Take a good, carefully-dried sample of the official leaves (with flowering tops), reduce some of this to No. 60 powder, and determine the alkaloid by Bird's process. Reserve the remainder for the dilution of the dry extract.

Reduce a larger quantity of the sample to No. 20 powder, and exhaust this by re-percolation with four times its bulk of 70 per cent. alcohol. Determine the proportion of alkaloid in the finished tincture by the official process for the assay of liquid extract of belladonna, or other reliable assay process.[1] Recover the alcohol from the remainder of the tincture by distillation, and dry the residue in shallow, flat, tared dishes, first over a water-bath, and finally in a hot-air oven at a temperature of from 60° to 70°C., until the weight is fairly constant. Take the weight of the dry extract, calculate the percentage of alkaloid in it, and incorporate with it a sufficient quantity of the standard powder to give by calculation a preparation containing 0·2 per cent. alkaloid. Triturate until thoroughly mixed, pass through a No. 20 sieve, and transfer the powdered extract to a well-corked or glass-stoppered bottle. Preserve in a cool, dry place.[2]

[1] *Pharm. Journ.*, **64**, 692.

[2] This may be very readily assayed by Bird's process for belladonna leaves already referred to.

A sample of extract prepared by the above process is submitted to this meeting.

Mr. MABEN said he wished to congratulate the authors of this paper on the excellent work it contained. It was only one of a series of many such papers which contained some of the most important contributions to British pharmacy in recent years. So far as the process was concerned, he had not any fault to find, but he considered that the standard recommended of 0·2 per cent. of alkaloid was much too low. According to the authors' own figures the average alkaloidal content of the leaves was about 0·09 per cent., so that the proposed extract was only twice the strength of the leaves. It was a question whether it would not be better to give 2 gr. of a standardized leaf powder just as soon as 1 gr. of a powdered extract rather than take the trouble and risk of making the extract. Messrs. Naylor and Bryant found that the green extract of commerce averaged higher than this, and he thought if they were going to make such a change it would be a mistake to produce an extract less than half the strength of the best extracts made under the present process. He would prefer percolation to exhaustion with a strong spirit, and then with acidulated water as recommended. Such an extract would contain at least 0·4 per cent of alkaloid. The firm the authors quoted worked to a standard of one of extract representing five of drug for other drugs as well as henbane, and though it was possible that this might be too high a standard in some cases, it was much better than the standards laid down in the Pharmacopœia for the extracts of belladonna, and he hoped that the mistake made in the case of the solid extract of belladonna would not be repeated when a standardized extract of henbane was made official.

Mr. H. W. JONES said he should like to ask a question in regard to the figures given in the paper. Starting with a menstruum of 40 per cent. the alkaloidal percentage was given as 0·292, with 50 per cent. 0·277, and with 60 per cent. 0·292 —the same percentage of alkaloid as with 40 per cent. menstruum. How did the authors account for that ?

Mr. WRIGHT said the figures given were the results actually obtained.

Mr. JONES, continuing, said if they took the juice of any

plant they got a certain amount of extract, but if alcohol were added a certain amount of inert matter would be thrown down, and the spirit extract would be *per se* stronger in alkaloid. If the extract was in powder its recognition ought to be easy when one had an acquaintance with the microscopical structure of the drug. To produce a dry standardized preparation of the drug would, in his opinion, be better than a soft extract. Dry extracts were formerly in the United States Pharmacopœia, but they were never popular because they had the fatal effect of "clogging" in a very short time.

Mr. Alcock said a very serious objection to the method suggested was the prolonged application of heat to such very delicate alkaloids as atropine and hyoscyamine. The text-books said that atropine did not exist in the plant originally, but by simple cold extraction it was made from hyoscyamine. How, then, must the prolonged heating affect the products to which the efficacy of the plant was said to be due? The B.P. adopted this process in extract of euonymus, and originally suggested sugar of milk, but had rejected that because the acid infusion produced set up a new product, which caused fermentation, resulting in it not keeping, and it was changed to calcium phosphate. A miller friend of his used for drying some of his preparations such substances as dry sodium sulphate and dry magnesium sulphate. He found that it suited his purpose and kept the powder dry and mobile. Mr. Wright's process introduced *débris* which the medical man wanted to eliminate. Mr. Schacht, who was one of the best of pharmacists, had said that what should be given to the medical man was the article minus the *débris*, and he (Mr. Alcock) was inclined to think that what Mr. Wright introduced into the product was objectionable. Mr. Schacht, in his researches on cinchona, prided himself that he produced bark minus woody fibre.

Mr. W. Gowen Cross asked whether all the samples of hyoscyamus were biennial, second year's growth.

Mr. Wright: Yes.

Mr. Cross, continuing, said Mr. Wright had mentioned a sample of juice which he (Mr. Cross) had the pleasure of sending to him some years ago, and it might be interesting to know that that juice was prepared by himself from the first year's leaves. It had been his custom for years to grow hyoscyamus, and when the winter approached and the leaves began to wither, he cut off some of the green leaves and bruised and pressed them

to prepare an extract from them, and he was pleased to see that the sample of juice he prepared contained quite the average quantity of alkaloid. It seemed to him an interesting fact in regard to the economy of the growth of this plant that they could get so much from both the first year and the second year's leaves.

Dr. SYMES said he could scarcely follow Mr. Alcock's suggestion that dried sodium sulphate or magnesium sulphate be added to the extract. His experience of the dried sulphates was that they reabsorbed a considerable amount of water when exposed to the air.

Mr. RANSOM suggested, with reference to the determination of the alkaloid, that the dry extract be estimated rather than the tincture, so that if there should be any loss of alkaloid the final result would not be interfered with. If it was possible to use the first year's as well as the biennial leaves it would be a convenience to manufacturers, because in some years the biennial leaf was hard to obtain, while the first year's was comparatively plentiful.

Mr. JAMES GRIER questioned the desirability of introducing extraneous matter into these extracts, as it made them unsuitable for outward application, e.g., glycerin of belladonna, if made with B.P. alcoholic extract, would contain sugar of milk, which was also objectionable in suppositories as in the B.P. belladonna suppositories. Mr. Maben said, if the extract was only to be made twice as strong as the powdered drug, twice the dose of the latter might just as well be used, but the principle in these cases was a therapeutical, not a pharmaceutical, one, and they were made to conform to a uniform dose : e.g., two parts of extract of strophanthus, B.P., were equivalent to one of seed. It was also important that the alkaloids of hyoscyamus should not undergo any change in the process of extraction under the influence of heat, alkali, or acid, since it had been shown that d-hyoscyamine was ten or twelve times stronger than the lævo variety, and, of course, was also stronger than the inactive isomeric atropine, and that while fresh juices were at first sight ideal pharmaceutical preparations, yet they varied in strength in wet and dry seasons, and an ideal process for the extraction of such drugs was still a desideratum.

Mr. WRIGHT, in reply to Mr. Maben in regard to the standard for extract, said that in the course of the paper the one thing they had set themselves against was fixing the standard too high,

and although they obtained a considerably larger proportion of alkaloid than they had taken for the standard, they had fixed on 0·2 per cent. of alkaloid as a standard because they thought it would not be too low for extracts of that kind. He was aware that by manipulation extracts could be obtained containing more alkaloid than that, but he did not think they would be justified in recommending a higher standard than 0·2 per cent. He had always thought the same in regard to the belladonna preparations of the B.P., which were responsible for a lot of trouble to pharmacists. With reference to the alkaloidal value of the annual and biennial plants, he had examined several samples, and he believed that the leaves of the annual plant contained just as much alkaloid as the biennial. He thought he was warranted in saying that was so. But it was a point well worth looking into and settling, because the idea that the leaves of the biennial plants were so much richer in alkaloid than the annual plants had arisen from the fact that from the biennial leaves they got every appearance of greater activity. Personally, he did not think that the biennial leaves were richer in alkaloid.

Mr. Peter MacEwan said that Mr. Wright did not appreciate his point exactly, which was that the biennial were richer medicinally. He suggested that the authors should determine the nature of the assay residues from annual and biennial leaves. He imagined that they would not be identical.

Mr. Wright said they did not distinguish between the two. He did not wish to be dogmatic, but Mr. MacEwan was rather awkwardly situated in speaking to a man who was always "Wright." The activity of the plants was due to the alkaloids contained in them, and if they got the characteristic alkaloids they produced all the medicinal activity of the plants.

Mr. MacEwan asked if the authors of the paper were sure they got the same alkaloids in the annual as in the biennial plants. They appeared to regard total alkaloid as a measure of medicinal activity, but did not prove it.

Mr. Wright said he was not in a position to give the proof, but he thought they might reasonably say so.

Mr. Martin said accumulated experience was in favour of the biennial.

Mr. White said he thought the point was settled by Gerrard as to the ratio between the alkaloids of the annual and biennial plants.

The President said he assumed it to be the pleasure of the

Conference to accord a hearty vote of thanks to Messrs. Farr and Wright for their paper, which had elicited so profitable a discussion.

The vote of thanks was accorded unanimously.

NOTE ON THE COLOURING MATTERS OF ROSA GALLICA.

By W. A. H. Naylor, F.I.C., and E. J. Chappel.

The petals of *Rosa gallica* have been the subject of investigation by chemists from time to time, but the varying results obtained suggest the necessity for re-examination. Cartier (*Journ. de Pharm.*, **7,** 531) found tannin, gallic acid, albumen, soluble salts of potassium, insoluble salts of iron, silica, and ferric oxide. Filhol (*Rep. Pharm.*, *Mai*, **1863**), describes the method by which he isolated a yellow colouring principle, which he considered identical with quercitrin. He found traces only of true tannin, and notes the presence of cyanin, gallic acid, and a large proportion of uncrystallizable sugar. Rochleder found that the gallic acid is accompanied by quercitannic acid. Senier (*Pharm. Journ.* [3], **7,** 650) examined the petals with special reference to the red colouring matter, which, until then, appears to have been neglected by chemists. From the results of his investigation he concluded that it was an acid which formed crystalline salts with the alkalies and amorphous ones with certain of the heavy metals. He prepared a lead salt, analysed it, and from the percentages of lead, carbon, and hydrogen obtained, deduced the formula $Pb_2C_{21}H_{29}O_{30}$. Apart from the fact that it contained nitrogen as a confessed impurity, he does not appear to have adopted the usual means of satisfying himself of the homogeneity of the compound.

It may be appropriately remarked that during the last ten years a number of yellow colouring substances resembling quercitrin have been extracted from plants, a few of which, when subjected to a more searching examination, have proved to be other substances. With the knowledge of that fact, and also that a completer examination of the colouring principles of *Rosa gallica* was desirable, we decided to give practical effect to this suggestion for re-investigation, and the communication we now make gives a preliminary account of two of the colouring matters of the petals.

Isolation of Yellow Colouring Matter.

The petals were thoroughly exhausted with 90 per cent. alcohol, and, after distilling off the alcohol, there was left a dark-brownish-red syrupy liquid. The liquid was diluted with water and repeatedly extracted with ether. The ether extract (*a*) was of a greenish-yellow colour. The aqueous residue (*b*) contained the red colouring matter.

The ether was distilled off from (*a*), and the residue consisted of a thick greenish-yellow oil mixed with a quantity of a yellow powder. To effect a separation the mixture was extracted thoroughly with petroleum ether, which abstracted fat, and, on standing, gradually deposited a brown substance. The portion insoluble in petroleum ether was treated with boiling alcohol to complete extraction and filtered while hot.

To the hot filtrate water, nearly boiling, was added in quantity sufficient to produce turbidity, and the liquid was set aside. The substance which had separated out was collected on a filter, washed with water, redissolved in hot alcohol, and reprecipitated with hot water. The two filtrates were mixed and concentrated, and the crop that was deposited was added to the bulk already obtained. It was then dried on the water-bath and extracted in a Soxhlet with chloroform, which removed a green substance. The residue insoluble in chloroform was crystallized from dilute alcohol. The final product was a yellow crystalline powder with a faint tinge of green. Examined microscopically, it presented the appearance of well-defined interlacing needles. At 220°C. it showed no sign of fusion, but the green tint had deepened. Its alcoholic solution gave, with ferric chloride, a brownish-black tint, and with lead acetate, an orange-red precipitate. Dissolved in solution of potash it gave a yellow to orange-brown solution, according to strength, and, when warmed with sulphuric acid, an orange-yellow liquid with a green fluorescence. On increasing the heat it became reddish, and finally a brown colour. It reduced Fehling's solution on boiling, but only after standing for some time. It did not appear to form compounds with acids, and with alcoholic potassium acetate it gave no definite precipitate.

(1) 0·2093, dried at 140°, gave 0·4770 CO_2, and 0·0730 H_2O.
C=62·15, H=3·88.

(2) 0·2073, dried at 140°, gave 0·4738 CO_2, and 0·0725 H_2O.
C=62·33, H=3·89.

$C_{15}H_{12}O_6$ requires C=62·50 : H=4·16.

Attempted Hydrolysis of the Yellow Body.

0·1732 Gm. of the substance dried at 140°C. was suspended in 200 c.c. of water, 3 c.c. of sulphuric acid added, and the mixture boiled for three hours. When cold the insoluble matter in the flask was seen to consist of a yellowish-brown substance, together with a quantity of the original practically unchanged. The addition of 6 c.c. of sulphuric acid was made and the boiling continued for six hours more. The insoluble product was collected, washed with water until free from sulphuric acid, dried at 140°C., and weighed.

(1)	
Weight of yellow body taken	0·1732 Gm.
Weight of product obtained	0·1668 Gm.
Percentage of product obtained	96·29

No glucosidal hydrolysis appeared to have taken place, and the filtrate did not reduce Fehling's solution.

Boiling with an alcoholic solution of hydrogen chloride was next tried, as it was thought that the substance when in a dissolved state would be more open to attack by the acid. 0·1566 of the substance dried at 140°C., 35 c.c. of alcohol, 15 c.c. of water, and 3 c.c. of strong hydrochloric acid were heated together under a reflux condenser on a rapidly boiling water-bath for three hours. The alcohol as it distilled off, was replaced by water. The substance, which separated when the liquid was cold, was collected, washed, and dried at 140°C.

(2)	
Weight of yellow body taken	0·1566 Gm.
Weight of product obtained	0·1234 Gm.
Percentage of product obtained	78·79

These figures would represent an unusually high yield of colouring matter, assuming it to be due to hydrolysis. As the filtrate did not reduce Fehling's solution and did not give the reaction with Molisch's test for carbohydrates, it does not seem probable that the substance is glucosidal.

The above products (1 and 2) were dissolved separately in hot 50 per cent. alcohol and the solutions left to evaporate spontaneously. On cooling, reddish non-crystalline substances separate out, that from (1) being deeper in colour than the one from (2). The red colour was more intense after separation from their respective solvents than before.

Attempts to obtain a crystalline acetyl compound by heating

the yellow body with acetic anhydride were not successful. It is hoped that when we are able to operate on the substance in larger quantity a crystalline derivative may be isolated.

Fusion of the Yellow Body.

It was heated with ten times its weight of potash at 210° to 230°. When cold, the melt was dissolved in water and the solution neutralized with hydrochloric acid. From it ether extracted a substance which, after purification, was identified as phloroglucinol. The aqueous liquid was then acidified and again extracted with ether, which, on evaporation, left a brownish crystalline mass. This was treated with hot water, filtered, and the filtrate shaken out with ether. The ether, on spontaneous evaporation, yielded a cluster of large needles, still much coloured. Its aqueous solution gave a green colour with ferric chloride, which changed to orange red on adding sodium carbonate. It did not reduce Fehling's solution, and was probably protocatechuic acid.

The behaviour of the yellow body as now described and its centesimal composition prove to demonstration that it is not quercitrin. For convenience of comparison we set out a few of the striking points of difference between quercitrin and our yellow body.

(1) Quercitrin readily hydrolyses, yielding a yellow crystalline product, quercetin, and a sugar which reduces Fehling's solution. Under the same conditions the yellow body hydrolyses with difficulty, if at all, giving red amorphous products, and yielding no substance that reduces Fehling's.

(2) Quercitrin gives a yellow precipitate with acetate of lead. Our yellow body gives an orange red one.

(3) Quercitrin fuses to a brown mass at about 135°, but our yellow body showed no signs of fusion at a much higher temperature.

Isolation of Red Colouring Matter.

A substance, which proved to be a crude form of the red colouring matter, was obtained in the following manner. The residue (*b*) left after the extraction with ether of the original percolate was diluted with a considerable volume of water and filtered. The filtrate was precipitated successively with zinc acetate and lead acetate. The respective precipitates were collected and well washed with chloroform water. The lead

precipitate, which was yellowish-green, was dried on a plate, suspended in alcohol, and decomposed by sulphuretted hydrogen. After filtering from the lead sulphide the excess of sulphuretted hydrogen was dissipated by passing a current of carbon dioxide through the filtrate. After slow evaporation of the alcohol at a low temperature, a red mass was left. The zinc precipitate was similarly treated, but the final residue was darker in colour and less promising than the product from the lead salt. The red mass obtained from the lead compound was air-dried and treated with ether, which removed a quantity of a yellow substance. The red colouring matter, purified so far as was attainable by the withdrawal of foreign bodies by solvents, was amorphous, deep red, soluble in water and alcohol, the solutions being deepened on the addition of diluted sulphuric acid. Its solution did not effervesce with sodium carbonate. With dilute potash solution it gave a deep red with a green fluorescence, and with an excess of the solution a yellowish-brown.

Senier obtained the red colouring matter by exhausting the petals, first with ether, and then with alcohol. The alcoholic solution he precipitated with lead acetate, suspended the collected and washed precipitate in rectified spirit, and decomposed it either with sulphuretted hydrogen or dilute sulphuric acid. From this alcoholic solution he claims to have obtained microscopic crystals of a sodium, potassium, ammonio-potassium, and ammonio-sodium salts of the red colouring matter, by adding to a drop of the alcoholic solution of the latter, placed on a glass slide, a drop of a solution of the alkali or alkalies corresponding to the above, and slowly evaporating by a gentle heat. With our purified product we were unable to confirm his observations as to the formation of crystalline alkali salts of the red colouring matter. All our attempts to induce the red substance to assume a crystalline form have so far proved a failure.

We are at present engaged in the preparation of both the yellow and red substances in quantities that will suffice for a more extended examination than is evidenced by the results recorded in this paper.

The best thanks of the meeting were accorded to the authors for their valuable contribution.

CALUMBA INFUSION AND CONCENTRATED SOLUTION,

By F. H. Alcock, F.I.C.

In the examination of such official preparations as infusions, concentrated solutions, tinctures, fluid extracts, and other galenicals, it is usual, provided they do not contain such active principles as easily determinable alkaloids and glucosides, to be contented with such physical characters as appearance, taste, smell, specific gravity, amount of total solids per cent. w/v, and if they contain alcohol, its amount per cent. by volume. As one of these data—the determination of the amount of the total solids—has found much favour with the pharmacist and public analyst in recent times, it has been my practice to carry the step a little further and ascertain the amount of ash left after gentle incineration, and to note qualitatively by litmus papers whether the ash was greatly or feebly alkaline. As the platinum dish is very convenient for this work the extra time and trouble involved do not amount to much. With the preparations which form the title of my paper this alkalinity of ash appeared to be relatively large, and during the process of ignition deflagration as of nitrates was observed. A qualitative examination of the ash showed that the alkalinity was due chiefly to lime and potash. Thinking that the subject might be of interest to the members of the Conference, the following experiments may be referred to :—

Fifty c.c. of an infusion of calumba, prepared in accordance with the official directions, gave on evaporation on the water-bath, in a flat-bottomed platinum dish, 0·273 Gm. of solid residue, which, on ignition, left 0·064 Gm. of a white ash, which was deliquescent and strongly alkaline, due, as above stated, to lime and potash chiefly. A larger sample of the calumba root was now carefully bulked and another quantity of B.P. infusion made, when 100 c.c. of it gave 0·612 Gm. of solids, 0·153 Gm. of ash, which required 10·0 c.c. of the N/10 solution of sulphuric acid to give a permanent acid tint to the methyl-orange indicator used. An infusion made as B.P., but allowed to stand 15 minutes only, gave per 100 c.c. 0·250 Gm. of solids, 0·074 Gm. of ash, and required 3·5 c.c. of the acid solution to produce neutrality. An infusion was next prepared of B.P. strength, but allowing it to macerate for 24 hours, in accordance with the instructions under liquor calumbæ concentratus ; 100 c.c. gave 0·712 Gm. of dry, solid extract, which, on ignition, gave

0·227 Gm. ash, and required 13 c.c. of the N/10 acid to produce neutrality. A comparison was made with these last figures by taking 10 c.c. of a concentrated solution of calumba, obtained from a well-known London wholesale firm, and on submitting it to the same process described above, the total solid residue weighed 0·475 Gm., the ash was 0·167 Gm., and the acid required was 14 c.c.

To ascertain whether reliance could be placed upon the figures for the same sample of root after a period of 9 months the experiments were repeated on July 25, when it was found that for the infusion B.P. the results were almost identical with those previously obtained, viz., total solids, 0·610 Gm.; ash, 0·150 Gm.; N/10 acid required 10 c.c., using 100 c.c of the infusion.

From these results there appears to be room for an extended examination upon this subject, and I hope the Conference authorities will pardon me for bringing so small a matter before them, my excuse being that the results obtained with calumba alone have seemed to me of some interest.

Summary of Results.

Preparation.	Strength.	Time.	Quantity Used.	Solids.	Ash.	(N/10) Acid Required.
Infusion . .	1 : 20	½ hour	50 c.c.	0·273Gm	0.064Gm	Qualitative only.
Infusion . .	1 : 20	½ hour	100 c.c.	0·612Gm	0·153Gm	10·0 c.c.
Infusion . .	1 : 20	¼ hour	100 c.c.	0·250Gm	0·074Gm	3·5 c.c.
Infusion . .	1 : 20 (July 25)	½ hour	100 c.c.	0·610Gm	0·150Gm	10·0 c.c.
Infusion as for conc. solution	1 : 20	24 h'rs	100 c.c.	0·712Gm	0·227Gm	13·0 c.c.
London sample of concentrated solution	1 : 2		10 c.c.	0·475Gm	0·167Gm	14·0 c.c.

Mr. Martin said it was an interesting paper, but he did not quite gather whether Mr. Alcock had used a mixture of spirit and water, as the B.P. ordered, in making the concentrated infusion of calumba, or whether he macerated with water only.

Mr. C. E. Perry said with regard to concentrated solutions in general and particularly calumba he thought it very

desirable that they should be standardized to a definite amount of solid extractive. If that were done it would be possible to get more uniformity in these preparations, and to ensure, that when diluted, they would represent, more closely than they did at present, the freshly made infusions of the Pharmacopœia.

Dr. Symes said the concentrated infusion of commerce was 1 to 7, and not 1 to 9. His experience was that contentrated infusions of 1 in 7 were nearly always used now as formerly, and therefore it would rather look as though it had been a failure to introduce a solution having the strength of 1 to 9. No doubt the B.P. authorities were anxious to gain experience of what was generally used, and he might say that a 1 to 9 infusion was almost unknown in pharmacy.

Mr. R. Brodie said with regard to standardized concentrated solution of calumba, he had always exhausted the root. There was no volatile principle in it, and so far as he was aware there was no alkaloid that could be standardized. He generally exhausted the root and evaporated down, making the infusion a strength of 1 in 7, not 1 in 9. He made a very satisfactory preparation, and where evaporation had gone too far he made up by adding a little water.

Mr. Job Preston said he found very frequently that the solutions were of varying specific gravity. He could quite understand that there was often a very great variation between the upper and lower strata in a bottle of concentrated solution, so that to gain uniformity it was desirable to shake the bottle before using its contents.

Mr. H. Wippell Gadd thought a little too much stress was laid on the extractive in these preparations. Mr. Alcock's results were not very easy to understand, because in some cases he had taken 50 c.c., in others 100 c.c., and 10 c.c. But, so far as he could understand them, the results seemed to be fairly uniform, and corresponded with some results he had before him. He had the results of the examinations of ten samples of the B.P. concentrated solution made in his company's laboratories, and Mr. Alcock's results practically confirmed them.

Mr. Alcock, who was thanked for his paper, in reply, said, with regard to Mr. Martin's question, he would like to remind him that he followed exactly the B.P. process, which did not mix the spirit and water first. If it had done so, it would not have served his purpose to mix the water with the spirit. He wanted to see the extraction by the solvent, and he therefore

used water alone. He was careful to shake the bottle before taking any quantity from it for examination—because he had found that even in water analysis shaking the bottle or not shaking the bottle before analysis made a great difference in the results obtained. With reference to Mr. Brodie, he stated that there was nothing in calumba that could be estimated. There was an alkaloid in calumba—berberine—but he found that the literature on the subject of berberine was very scanty, and it seemed that the extraction of berberine was most difficult. In regard to Mr. Gadd's remarks, the first 50 c.c. was a tentative experiment, and they would see that the ash was examined qualitatively, and he thought he would compare the experiment with 100 c.c.

THE DETERMINATION OF BORIC ACID IN CIDER, FRUITS, ETC.

By Alfred H. Allen and Arnold R. Tankard.

The natural occurrence of traces of boric acid in certain plants, trees, fruits, etc., has been pointed out by various observers,[1] and the presence of this acid in wine, cider and allied products follows as a natural consequence. These facts were confirmed at the outset of our experiments upon the presence of preservatives in cider. All the ciders examined were found to contain a small but distinct amount of boric acid, and a similar result was obtained by the examination of various fruits, such as apples, pears, quinces, grapes and pomegranates. Hence, boric acid in cider, perry, wine, etc., cannot be regarded as an adulteration unless the amount is materially greater than can be fairly ascribed to natural causes. Our experiments have been

[1] The following is a summary of the chief papers on this subject. The English references only are given: Boric acid in trees and plants, E. Bechi, *J.C.S.*, 58, 656; *J.S.C.I.*, 9, 635; in hops and (therefore) beer, but not in malt or barley, J. Brand, *Analyst*, 18, 135; in all parts of the vine, Baumert, Rising (reference not known); in peach trees and peaches, Knorr (reference not known); in grapes and wine, apples, pears, radishes and lettuce, M. Gassend, *Pharm. Journ.*, 23, 6; *J.C.S.*, 62, 93; in various fruits, A. Hebebrand, *Analyst*, 1903, 28, 37; in fruits generally, E. Hotter, *J.C.S.*, 1890, 58, 1,338; in the ash of fruits and vine leaves, H. Jay, *J.C.S.*, 70, 2, 327; in wine, water-melon, etc., C. A. Crampton, *J.S.C.I.* 8, 569; in wines, cider, perry and fruits, Jay and Dupasquier, *J.C.S.*, 70, 2, 76, 327; absent from natural wines, Villiers and Fayolle, *J.C.S.* 70, 2, 75.

chiefly made on cider and apples, and the following observations have special reference to these substances.

The *detection* of boric acid in cider and fruits can be readily effected by evaporating 20 c.c. of cider or apple-juice to dryness and igniting the residue, or by directly igniting 25 Gm. of apple or other fruit. The ash is rendered distinctly acid to litmus with dilute hydrochloric acid, a piece of turmeric paper partially immersed in the liquid, and the whole evaporated to dryness on the water-bath in a flat porcelain dish. The residue is further dried in the water-oven for a short time. In the presence of boric acid the turmeric paper will acquire a brownish-red colour, which, on being moistened with a drop of caustic soda, is changed into a variety of colours, chiefly green and purple.

The *quantitative determination* of boric acid in cider and fruits, etc., we have found very troublesome, and this has been the subject of numerous experiments. The difficulty of the analysis is enhanced owing to the minute quantity of boric acid present, and the determination is further complicated by the presence of phosphates. These salts render inapplicable the direct employment of R. T. Thomson's well-known process (*J.S.C.I.*, **1893,** p. 433), in which the solution is first made neutral to methyl-orange and then titrated with caustic soda and phenol-phthalein in presence of glycerin, the end-point of the titration corresponding to the formation of $NaBO_2$. The unsuitability of Thomson's method without modification in the presence of phosphates is due to the fact that while phosphates of the formula MH_2PO_4 are neutral to methyl-orange, they are acid to phenol-phthalein. We have made a number of experiments with a view of overcoming the difficulty caused by the presence of phosphates in quantity, but without success. It does not seem possible to make an allowance for the disturbing action of the phosphates nor does the addition of glycerin after the aqueous liquid has been rendered neutral to phenol-phthalein overcome the difficulty, owing to the fact that boric acid is distinctly, but indefinitely, acid to phenol-phthalein, even in the absence of glycerin.

F. Parmentier (*Comptes rend.*, **1891,** cxiii., 41 ; abst. *J.C.S.*, lx., 1551) has devised a process for the determination of small quantities of boric acid, based on the solubility of borates in a solution of ammonium nitrate. The method has been found quite useless for our special purpose, owing to the fact that it is impossible to titrate boric acid with alkalies in the presence

of large quantities of ammonium nitrate, since ammonia is set free during the titration. Boric acid is, moreover, more or less volatile when heated with ammonia or ammonium nitrate.

After a large number of experiments, the following method for the determination of boric acid in cider, etc., based on the moderate solubility of calcium borate in water, was devised: About 100 c.c. of cider or other liquid is evaporated to dryness with a few cubic centimetres of a 10 per cent. solution of calcium chloride; or, in the case of fruits, about 50 Gm. weight is cut up into small pieces and the solution of calcium chloride poured over the mass, which is then evaporated to dryness. The dry residue is well charred, boiled with about 150 c.c. of distilled water, and the liquid filtered. The carbonaceous residue is thoroughly incinerated at a moderate temperature, and when cold boiled with a further quantity of 150 c.c. of water, and allowed to stand in the cold for some hours, or preferably overnight. The liquid is then filtered cold, and the filtrate added to the first extract.[1] The mixed aqueous extracts are next evaporated to a volume of 25 or 30 c.c., and after cooling neutralized by decinormal acid, using methyl-orange as indicator.[2] An equal volume of glycerin is next added, and the liquid titrated with phenol-phthalein and 1/20th normal caustic soda solution (free from carbonate). About 10 c.c. more glycerin should now be added, when, if the titration is complete, the red colouration will remain. Each cubic centimetre of the 1/20th normal solution of caustic soda required represents 0·00175 Gm. of boric anhydride, B_2O_3; 0·0031 Gm. of crystallized boric acid, H_3BO_3; or 0·004775 Gm. of crystallized borax, $Na_2B_4O_7 + 10H_2O$. The above process gives good results when the amount of boric acid present in the sample taken is not less than 0·005 Gm.

We have also examined the well-known method for the determination of boric acid based on the volatility of methyl borate, and find the following to be the best method of operating:—A suitable quantity of the substance under examination is treated with calcium chloride solution as already described,

[1] It is desirable to extract the residue for a third time with hot water, allowing the liquid when cold to stand for some time before filtration. This third extract when titrated separately will generally be found to be free from boric acid. If not, the amount found must be added to that already extracted.

[2] Care should be taken that all the borate is in solution before the titration is begun.

and well charred, and the main portion of the salts extracted with about 50 c.c. of water. This aqueous extract is transferred to a distillation-flask of about 100 c.c. capacity, and cautiously evaporated nearly to dryness over a naked flame. Meanwhile the charred residue is incinerated, the ash (nearly white) moistened with 2 c.c. of strong sulphuric acid, and the mixture warmed. When the evolution of hydrochloric acid gas is nearly at an end, the acidified residue is transferred to the distilling-flask containing the evaporated aqueous extracts. The last portions are washed in with 10 c.c. of methyl alcohol,[1] the flask immersed in a boiling-water bath, and the liquid distilled almost to dryness. A further addition of 10 c.c. of methyl alcohol is then made, and the distillation repeated. As many as six such treatments are usually required. Between each distillation the residue in the flask should be allowed to cool before the next addition of methyl alcohol is made. The residue finally contained in the distilling-flask should be tested by the flame-reaction with alcohol to ensure that the whole of the boric acid has been volatilized. If this is not found to be the case, the distillation should be repeated once or twice more.

The alcoholic vapours are passed into 25 c.c. of water contained in a flask, the end of the condenser-tube dipping into the liquid. When the process is completed, the distillate is evaporated over a water-bath until free from alcohol. By this treatment the methyl borate is hydrolyzed, and the boric acid left in a free state. The residual liquid is diluted with a little water and rendered exactly neutral to methyl-orange. An equal volume of glycerin is then added, and the liquid titrated with 1 20th normal caustic soda and phenol-phthalein as already described.

The glycerin used in these processes should be rendered neutral to phenol-phthalein just before use, as it is generally slightly acid in reaction.

In many of the processes already in use for the separation of boric acid by distillation, the methyl borate is distilled into a solution of caustic soda, and after evaporation of the alcohol the aqueous liquid is titrated in the usual way. In our experience, however, when an alkali was used, the results were always above the truth, even when specially purified methyl alcohol was employed. For this reason the use of caustic soda is not to be recommended, and, as previous experiments have shown, is

[1] Ordinary wood-spirit of good quality, purified by redistillation over caustic potash, is suitable for this purpose.

quite unnecessary. (See Allen's *Commercial Organic Analysis* vol. iv., footnote to p. 178.)

The following results were obtained in a series of experiments made to test the accuracy of the processes here described. A known weight of crystallized borax was added either to a mixture of calcium chloride, magnesium sulphate and sodium phosphate, or to a known weight of apple. In the latter case an exactly similar portion and weight of the same apple was treated with calcium chloride and the boric acid determined, and deducted from that found in the other portion to which borax had been added :—

—	No. of Experiment.	Substances Added to the Borax.	Borax Taken.	Borax Found.
			Gm.	Gm.
Extraction Method.	(1)	Calcium chloride, magnesium sulphate, and sodium phosphate	0·200	0·198
	(2)		0·200	0·204
	(3)	50 Gm. of apple	0·020	0·019
	(4)		0·020	0·020
Distillation Method.	(5)	None.	0·200	0·197
	(6)	None.	0·020	0·022
	(7)	Sodium phosphate	0·200	0·201
	(8)	Sodium phosphate	0·020	0·023

Richmond and Harrison's method (*Analyst*, 1902, xxvii., 179) for the determination of boric acid in butter is rapid and accurate for its intended purpose, but the presence of phosphates in fruits and fruit-products renders the process unsuitable for the determination of boric acid in these substances.

A colorimetric method for the determination of boric acid in milk and other foods has been devised by Cassal and Gerrans (*Brit. Food Journal*, October, 1902.) The process is based upon the fact that in the presence of oxalic acid the colouring-matter of turmeric forms with boric acid an intense magenta-red colour more delicate than the ordinary turmeric reaction (that is, when obtained in the absence of oxalic acid), and permanent for many hours. The alcoholic solution of the colour formed in the reaction is compared with that from a known weight of boric acid. The method is said to be reliable and accurate, but appears to be rather lengthy and tedious.

The two processes described at the beginning of this paper

are obviously applicable to a considerable number of other substances besides cider and fruits; and their employment will, we believe, be found to result in a large saving of time, while the accuracy attained will at least equal that of other more tedious methods now in use.

The following table shows the proportion of boric acid contained in various fruits and ciders, etc., examined by us :—

Fruits, etc.	Boric Acid, H_3BO_3.
(1) Apple (Norfolk)	0·009 per cent.
(2) Apple (Fox Whelp)	0·013 per cent.
(3) Apple (Old Fox Whelp)	0·011 per cent.
(4) Pear, No. 1	0·007 per cent.
(5) Pear, No. 2	0·016 per cent.
(6) Quince	0·016 per cent.
(7) Pomegranate	0·005 per cent.
(8) Grapes	0·004 per cent.
(9) Norfolk Cider	0·009 Gm. per 100 c.c.
(10) Hereford Cider	0·017 Gm. per 100 c.c.
(11) Devonshire Cider	0·004 Gm. per 100 c.c.
(12) Apple Juice (Devon)	0·004 Gm. per 100 c.c.

The PRESIDENT said that the subject was not perhaps within the sphere of the daily work of those present, but it was of very great interest to him and to those who prepared liquids which must necessarily contain some amount of preservatives.

Mr. WHITE pointed out that it had been shown that many fruits contained the acids used as preservatives, and it was necessary, therefore, for the analyst to carefully distinguish between what was natural to the fruit and what might have been added as a preservative. He should like to ask if in the distillation method there was any loss of boric acid during evaporation.

Mr. ALCOCK said that boric acid had been found in the B.P. sherry. Some vin. ipecac. was suspected of having had boric acid added as a preservative, but it was traced to its source, and was found to be due to the clarifying of the original sherry by some earth which contained borate. He thought that was interesting to pharmacists because if boric acid was found in vin. ipecac. it might not necessarily have been added.

Mr. H. W. Jones said that it had long been known that boric acid was a constituent of grapes.

Mr. J. Rutherford Hill said boric acid was very volatile in presence of steam, and it was quite possible there might be a loss of boric acid in boiling down.

Mr. Brewis said he rather anticipated that there would be a loss of boric acid in the evaporating process. He noticed that in some of the experiments the amount of borax found was in excess of the borax taken.

Mr. Tankard, in reply, said that both salicylic and boric acids were now well known to occur naturally in many plants, as pointed out in the paper, and methods had had to be devised (notably in the case of the German official method for the analysis of wine) to discriminate between the acid naturally present and that added as a preservative. The chief point raised by the members of the Conference seemed to be the question of the volatility of boric acid on evaporation with steam. Mr. Tankard quoted *Commercial Organic Analysis* (iv., p. 178, *et seq.*) where the authors record their experience on this subject. It was found that when an alcoholic solution of methyl borate was mixed with water and evaporated, the amount of boric anhydride obtained on ignition of the residue was quite as great as when an aqueous solution of an equivalent amount of free boric acid was similarly treated: and, although when large amounts of boric acid are being dealt with there is serious loss by volatilization on evaporation with water, in the case of small amounts of the acid (say, a few milligrammes) no appreciable loss occurs under the prescribed conditions, as shown by the results obtained (see Table I. in paper).

The President said the Conference owed a special vote of thanks to Mr. Tankard for the paper, which was of exceptional interest. The vote of thanks was accorded to Mr. Tankard unanimously.

NOTES ON RADIO-ACTIVITY.

By W. Harrison Martindale.

During the last few months I have been collecting work on radio-activity, and, in bringing forward these notes on the

subject, I hope they may prove of interest to members of this Conference. I have endeavoured to make the information the latest available. The well-recognized features of radium and the other radio-active elements I do not propose to dwell upon, as these are described exhaustively in the many scientific and popular treatises.

The property of radio-activity was in reality first discovered by Becquerel, in 1896, for uranium-containing minerals and chemicals of every kind. The rays from uranium salts without the intervention of sunlight can be shown photographically to penetrate aluminium, bone, glass, black paper, etc., at a distance of several inches, and thorium nitrate (the constituent to the extent of 98 per cent. of Welsbach mantles) produces similar photographic effects.

Of late there has been much discussion as to the change that the radium atom is undergoing and the probability of uranium being its parent. Rutherford suggested that radium is analogous to the first bodies, designated uranium-X and thorium-X, resulting from the break up of uranium and thorium, and not to these elements themselves. I may here briefly outline the work on thorium. Thorium has long been known to be of a complex nature, and an American professor a little time ago caused some excitement by announcing that he had split it up into carolinium and berzelium. If ammonia be added to a solution of thorium nitrate the hydroxide is found on separation to have lost more than half its activity, whereas the filtrate from this hydroxide on evaporation to dryness possesses the bulk of the activity. This residue (the thorium-X soluble in NH_3) is minute, and weight for weight is 1,000 times as active as the original thorium nitrate. Now, the precipitated thorium hydroxide regains its activity just as fast as the thorium-X loses it; furthermore, the activity of the precipitated hydroxide added to that of the thorium-X is always equal to that of the original thorium nitrate before the process.

Thorium-X loses its activity in a month. It produces an emanation, and this gas-like body changes into the matter producing the excited activity.

Similarly, uranium yields a uranium-X; but this does not give rise to an emanation or to excited activity. As yet a radium-X is not known.

The position is:—

Uranium.	Thorium.	Radium.
↓	↓	↓
Uranium-X.	Thorium-X.	Radium emanation.
↓	↓	↓
End product.	Thorium emanation.	Matter causing excited activity.
	↓	↓
	Matter causing excited activity.	End product.
	↓	
	End product.	

The amount of radium in pitchblende leads scientists to think that there is a direct relation between the amount of radium developed and the time taken to decay. It has been found [1] that old uranium salts appear to contain more radium emanation than those freshly made. Many investigators are instituting experiments to watch the gradual development of radium in uranium salts and minerals. One worker calculates that the average life of the radium atom being 1,500 years (minimum), and the rate of break-up being in geometrical progression, $1\frac{1}{2}$ Mgm. ought to disintegrate per gramme in a year, or, if we take a maximum computation, 1/100 Mgm. would do so in this length of time. He proposes, therefore, to put on one side a few hundred grammes of freshly prepared uranium nitrate, and to examine for radio-activity in a few months.

Soddy [2] forestalled these results by finding the quantity was less than 10^{-11} Gm. in twelve months from 1 kilo. of uranium nitrate. Soddy and Ramsay (*ibid.*) showed that less than 1/1,000 part of radium changes per annum, and the rate of change of uranium may be assumed to be one million times slower, therefore 5×10^{-7} Gm. of uranium nitrate would change per year. Soddy concludes that less than 1/10,000 part of the theoretical quantity is formed in the first year, and inclines to the belief that uranium is not the parent of radium.

An American investigator [3] found an agreement between the quantity of uranium and of radium present in certain ores. Joly [4] inclines to the view that radium may be an atomic com-

[1] Whetham, *Nature*, May 5, 1904, p. 5.
[2] Soddy, *Nature*, May 12, 1904, p. 30.
[3] Boltwood, *Nature*, May 26, 1904, p. 80.
[4] Joly, *Nature*, May 26, 1904, p. 80; also July 14, p. 246.

bination of radio-active products with some of the heavy metals in pitchblende. It would, therefore, represent the synthesis rather than the disintegration of an element. He instituted experiments in July to test the yield, if any, of radium emanation by artificial chalcolite (uranium-copper-phosphate). Simultaneously pure uranium nitrate and impure uranium nitrate (crystallized with small quantities of heavy metals) were put under observation. Strutt[1] found the proportion of radium and uranium in minerals constant, e.g., copper uranite dissolved in sulphuric acid gives an amount of radium emanation about equal to that yielded by the same weight of Joachimsthal pitchblende; the percentage of uranium is also about the same.

Radium has undoubtedly been produced since the formation of the mineral; Ramsay and Soddy's determination of the rate of production of the emanation proved this, and Strutt claims that this proves that uranium must be the parent of radium.

In considering a few particles of radium, we realize that most of the atoms behave as if they were permanent. None of them are, of course, really so, though only very few are breaking up from moment to moment.

A writer on the subject[2] imagines one in every million billion atoms of thorium to throw out per second a fraction of its mass, i.e., the alpha-ray, the remainder of that atom becomes the thorium-X—this again throws off another part of its mass, becoming the atom of the emanation—this changes into the matter producing excited activity, and so on. It would take at least a million years for 1/1,000 part of the mass of thorium or uranium to be changed. The activity of radium being 1,000,000 times greater than that of thorium, about the same proportion of this body changes as of thorium: in other words, according to this author, the life of radium is not more than 1,000 years.

In the case of radium, it is suggested by Rutherford[3] that after the emission of the alpha particle the rest of the radium atom is radium-X: this then disintegrates into an alpha particle, and the emanation, which latter in turn breaks up, expelling more alpha particles and changing into the matter which causes excited activity; the final product being perhaps polonium, the radium "atom" consisting, therefore, of the polonium atom and about six alpha particles, but these, when their charge is

[1] Strutt, *Nature*, July 7, 1904, p. 222.
[2] Bottone, *Radium and all About It.*
[3] Rutherford, *Nature*, July 14, 241.

neutralized by a negative corpuscle, are believed to become helium atoms, with the result that the radium compound radical would have the formula $PoHe_6$. Polonium has, however, I believe, been obtained free from radium (spectroscopically).

Soddy [1] states that 25 per cent. of the entire alpha radiation comes from the radium, and the remainder from the emanation and the matter causing excited activity.

Atomic Weight.

Madame Curie's figure of 225 may require confirming, the spectroscopic value being 257·8, but the former figure still has its supporters. A recent writer in *Nature* [2] pointed out in detail certain defects in the spectroscopic calculations; his corrections place the theoretical value nearer 225 than 257. Madame Curie placed radium in the Mendeléeff Periodic Law after barium, with the alkaline earths in the row already containing uranium and thorium. Naturally there arose a great controversy among the various schools of chemical belief as to the position that radium should occupy. Mendeléeff, for one,[3] was not inclined to the disintegration theory. In endeavouring to fit in argon and helium and the other new elements in his periodic system; he came to the conclusion that the "ether" itself must be atomic, and be placed in the argon and helium group, and he offered the opinion that the energy of radium, its light and electrical properties, were simply due to the emission of the ether atoms.

Rays.

The radio-active elements are by most scientists regarded as slowly breaking up, and at a definite uniform rate for each individual body. This takes place in stages, the emanation of radium and thorium and the active matter resulting from further change of the latter causing induced activity, are transitional forms between heavy and light bodies, and have been called metabolons. On separating the metabolon from the original matter, the latter goes on accumulating the transitional body. The amount of helium obtained by Ramsay and Soddy from radium was a mere bubble.

[1] Soddy, *Nature*, February 11, 1904, p. 343.
[2] Sutherland, *Nature*, April 28, 1904, p. 606.
[3] *C. and D.*, 1 | 1904, 579.

Alpha-Rays.

Lodge [1] classified the various types of rays used in medicine :—

Rays.	Various Effects.	Various Sources.
Cathode rays	Chemical	Battery, continuous.
X-rays	Photographic	Coil, intermittent.
α-rays	Electroscopic	Dynamo, alternating.
β-rays	Physiological	Leyden jar shocks.
γ-rays	Bactericidal	High frequency.
Brush discharge	Therapeutic	Tesla coil.
Radiant heat	Inflammatory	Static machine.
Light	Anatomical	Arc lamp.
Ultra-violet rays	Illuminative	Vacuum tube.
N-rays (?)	Fluorescent	Radium, etc.

The order of the above is of no particular moment, and they are only lists to be read downwards. Every electrical current may be considered a continuous stream of electro-negatively charged electrons. In the case of radium these electrons ionise the air and produce, chemically, oxides of nitrogen and ozone ; this is probably an important factor in their inflammatory action on the skin.

In "hard" X-ray tubes the vacuum is very high and the electrons have a correspondingly enormous velocity, hence the greater suddenness of the stoppage of the stream and the greater the penetrative effect produced. The α-rays (very slightly deviable in a magnetic field, constituting about 99 per cent. of the entire radiation) are cut down to half value by passing through a sheet of aluminium, 0·0005 cm. thick ; the β-rays by passing through 0·05 cm. of Al, and the γ-rays by passing through 0·8 cm. of Al.

Madame Curie found that a singular law of absorption existed, namely, that the absorbability of the rays increased with the thickness of the matter to be traversed, i.e., between the limits 1 to 6 Cm., that a screen of lead 1·8 Cm. thick transmits 2 per cent. of the radiation it receives, and a screen 5·3 Cm. thick transmits 0·4 per cent. of the radiation it receives. The alpha-rays are about 1,000 times the mass of the cathode ray particle. They have a velocity one-tenth that of light, i.e., they travel at about 20,000 miles a second.

[1] Sir O. Lodge, "Series of Lectures to Med. Practitioners on Physics Applied to Medicine, "Med Elect. and Radiology," March, 1904.

Several simple experiments can be shown to demonstrate the ionising power of these alpha particles by collision with the neutral molecules of a gas; they tear them asunder into ions. It is a very remarkable thing that in the case of polonium we have alpha-rays without any beta radiations; this is difficult to conceive.

To demonstrate the α-rays the zinc sulphide screen is far the most sensitive.

Beta-Rays.

Three hundred million atoms would lie side by side in an inch, and electrons are one thousand million million times smaller than the atoms of hydrogen. These are the atoms of electricity, and they are analogous with the cathode rays, but differ in that they are projected into space. Madame Curie states that the intensity of the β-rays varies with the thickness of the radium layer. The most powerful fluorescer for this type of radiation is native zinc silicate, which is known as willemite.

Gamma-Rays.

These are in all probability X-rays resulting from the bombardment of the radium substance by the β-electrons. They result directly from the radium and not as a secondary effect. They are, it is assumed, generated at the moment of expulsion of the α- and β-rays, and they are always proportional in amount to these. These rays, as shown by Madame Curie, traverse several centimetres of lead.

A marked difference[1] has been observed, however, between the relative conductivity of gases for the γ-radium rays and the X-rays. For the former Strutt showed that the conductivity varied directly with the density, but in the case of the X-rays there is a marked divergence :—

—	Density.	γ-Rays.	X-Rays.
Air	1·0	1·0	1·0
Carbonic acid	1·53	1·53	1·6
Sulphurous acid	2·19	2·13	7·97
Chloroform	4·32	4·88	31·9
Methyl iodide	5·05	4·8	72·0

Another investigator in *Nature* finds that these differences

[1] Eve, *Nature*, March 10, 1904, p. 436.

narrow down if the comparison is made with a "hard" X-ray tube, so that the difference seems to be one of degree rather than kind.

The γ-rays can be well shown with a large crystal of barium or lithium platinocyanide.

A useful application of the ionising effects of radium has been devised by a worker[1] at the botanical laboratory in Dublin, namely, to prevent the electrification of sections cut in paraffin, their adhering, curling up, etc., a tube of radium may be fixed on to the microtome knife with very satisfactory results. There are many applications of this kind which will doubtless be developed as the material becomes more common.

The Emanation.

This gaseous body, which can be passed on from one vessel to another, and which can be condensed by low temperature into solid or liquid matter, was in the early days the subject of considerable confusion with the radiation. It is strongly radiol active, and, as has already been described, is unstable.

Rutherford claims that a cubic inch would probably melt a glass tube containing it, and as it possesses three-quarters of the power of radium, a few pounds of it would drive a ship across the Atlantic. Seventy tons of radium would, however, be necessary to produce each pound of emanation.

Ramsay and Soddy found helium occluded in cleveite and other radio-active minerals. They watched the gradual development of the helium spectrum in a sealed tube, in which the radium emanation was originally condensed by the aid of liquid air. It has been suggested, but not yet conclusively proved, that the alpha particle is an atom of helium. These investigators[2] conducted elaborate experiments with the object of ascertaining the volume of emanation emitted by radium, and also the amount of helium resulting from the change. One of their statements is to the effect that 50 Mgm. had produced 0·1 cubic mm. of helium in sixty days: this quantity weighs 0·000018 Mgm., hence 1 Gm. of radium bromide should give 0·0022 Mgm. per annum. They also claim that only one atom of emanation can be produced by one atom of radium, and that only one α-particle is expelled at each disintegration.

Moss has recently conducted some experiments, the results

[1] Dixon, *Nature*, June 30, 198.
[2] *Chem. News*, May 27, 1904, p. 255.

of which indicate that helium probably exists in pitchblende in the free condition in minute cavities.

The mineral Kunzite is illuminated under the influence of the emanation but does not respond to α-rays. Soddy explains that this illustrates that the emanation only gives α-rays, and that the β-rays are only produced when some of the emanation has changed into the matter causing the excited activity.

Heat.

The heat energy from 1 Gm. of uranium oxide had been estimated in 1901 as at least 0·03 calorie per gramme per annum. However, when multiplied out by one million this does not accord with the present estimate of the heat emitted by radium, which is at the rate of 100 Gm. calories per gramme per hour. More than two-thirds of the heating effect is not due to the radium at all, but to its emanation, and to the product of this latter body. Another statement of the theory is that the heat is due to the radio-active substance being bombarded by its own α-rays. It is possible that by combining these disintegration products at a high temperature the synthesis of radium may yet be achieved.

Estimation of Activity.

The time occupied by uranium to discharge an electro-negatively charged electroscope is noted by a watch and is designated "unity"; a telescope and micrometer scale are necessary for the purpose. Glew's instrument [1] is simple and reliable, avoiding an elaborate and costly mechanism. It consists, as you observe, of a wooden framework, with glass back and front, one side being ground glass. In the centre is a simple improvised electroscope. A positive charge is accorded the leaf by the aid of a camel's hair brush. We now note how long this charge will remain: usually it will do so for a day or two. Markings are made on the ground glass at certain intervals, and on bringing a known weight of pure radium bromide, preferably in a metal box, to within a distance of a yard, we note the time taken for the leaves to fall. Then, if a pure sample causes the drop in sixty seconds, it follows that the same weight of another specimen doing the same work in 120 seconds is only 50 per cent. pure, and so on.

[1] Glew, *P.J.*, 1 | 1904, p. 440.

In this method the β- and γ-rays are not measured directly (the α-rays do not come in at all, as they do not penetrate the metal box). What is measured is the ionization of the air produced by this 1 per cent. of the total radiation.

"Either the impact of the negatively charged corpuscles or β-rays (electrons), or the sustained agitation resulting from the γ-rays (ether disturbances), render the air electrically conducting, and thus the charge leaks away in proportion to the rays producing the ionization."

Polonium.

Soddy claims that Markwald's radio-tellurium is identical with polonium. Markwald obtained, he says, only 4 Mgm. of his radio-tellurium from eight tons of pitchblende, and he says this body does not decay. I think Soddy has vindicated his position; Markwald would have done better not to rename Madame Curie's polonium. Madame Curie states in her thesis a specimen of bismuth nitrate containing polonium lost half its activity in eleven months. Its radiation is propagated only 4 to 6 Cm. in air.

By employing a glass screen of zinc sulphide, as suggested by Glew,[1] the scintillations from this α-radiation produce a good effect on a black ground. There is no diffuse lighting, as in the case of the spinthariscope. It is possible to view the actual bombardment from pitchblende itself. Very thin films of gold, silver, of mica and celluloid allow these rays to pass. By using this screen and a revolving wheel, Glew found the duration of a scintillation to be less than 1/50,000th of a second. These polonium discs may be coated with a celluloid film to protect them, which is washable and sterilisable, e.g., in therapeutic use.

Blondlot's Rays.

In abstracting all the recent work on this subject, I have come to the conclusion that the effects described are in all probability subjective or due to warmth, or to the changing activity of the eye in the dark, or to the natural decay of the sensitive calcium sulphide.

[1] *Archives Roentgen Society*, June, 1904.

Radio-Activity of the Air.

It has been demonstrated [1] that the ground air is often radio-active, the supposition is that substances producing a radio-active emanation similar to that of radium are distributed among the constituents of the soil in question. It may be mentioned that a large boiler full of ordinary atmospheric air was kept closed for six weeks, the air was then examined without any activity being found to have developed, confirming the view that it probably comes from the soil in all cases.

Radio-Activity of Mineral Waters and Minerals.

The activity of the gas collected from the source of Buxton water was found to fall to half value in about three and a half days (the corresponding time for the radium emanation being 3·7 days, Rutherford). It has been suggested that the gas thus collected might be employed therapeutically.

Strutt [2] read a paper before the Royal Society dealing with this matter, and the examination of minerals for radio-activity. His method for the latter is simply to heat the mineral in a crucible, and to examine the rate of decay of the emanation evolved. The results he claims are definite, and can be obtained by working on small quantities. A mineral called monazite, from Norway, though containing no radium, yielded helium in fair quantity.

Bath water contains a large proportion of sulphates; radium sulphate is probably soluble only to the extent of about 1 in several hundred thousand parts of water. It follows, therefore, that the radium is found here chiefly in the deposit, and not in the water. It was calculated roughly that 0·3 Gm. of radium is deposited per annum, the total deposit of mud, etc., being about 500,000 kilos. per annum. The volume of gas yielded is about 100 cubic feet per diem. This had been previously found to contain helium to the extent of 1 1,000th of its volume, i.e., 3 litres per diem or 1,000 litres per annum. It is concluded that the proportion of this "end product" to radium is about of the same magnitude as in the radio-active minerals. The spring probably draws its supply from minerals of this nature. Droitwich brine [3] on boiling yielded a radio-active gas, and

[1] Elster and Geitel, *Nature*, December 17, 1903, p. 154; March 10, 1904, p. 444.
[2] Strutt, *Nature*, March 17, 1904, p. 473.
[3] *L.*, 1 | 1904, 1010.

Russian mud baths possess[1] radio-activity, and have an inhibitory action on bacterial growth.

A new radio-active mineral from Ceylon was examined by Dunstan, and independently by Ramsay, and the latter found it very rich in helium.

Therapeutic Use.

The fact that radium rays penetrate both bone and flesh to an equal extent has, up to the present, prevented its use for skiagraphic purposes, and there is, in addition, the difficulty of the irritation which may be produced on the part of the body during such process.

The β-radiation has an inhibitory action on many organisms, e.g., that of typhoid, anthrax, diphtheria, *B. coli*, and many others. Bacterial colonies exposed three days to the β- and γ-rays emitted by 10 Mgm. of radium bromide, and removed to a photographic plate, affected the plate even through a double layer of lead foil.[2] The extraneous micro-organisms in vaccine lymph may be killed off by the aid of the radiation.

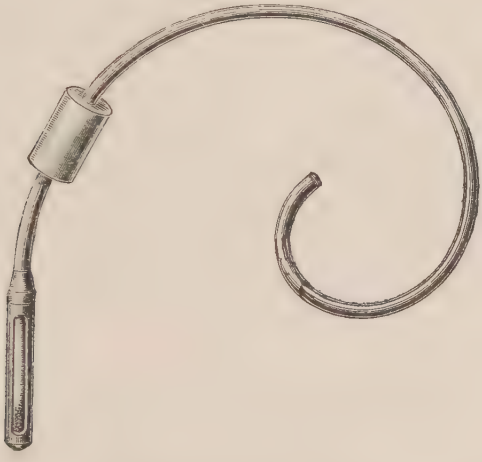
Sir Oliver Lodge inclines to the opinion that radium for medical purposes will replace almost every other source of radiation. He believes the beneficial action on rodent ulcer is due to the oxidising power of air ionised or ozonised by the rays: this, he concludes, is the reason why deep-seated cancer has not as yet been benefited. What is necessary is potent oxygen, produced, for example, by injecting hydrogen peroxide and rendering the latter active by penetrating rays. The oxygen must be in an unstable form such as exists in arterialised blood. If this is not the healing factor, it remains to be found out what is the actual cause, and to introduce this factor as near as possible to the diseased part.

You will be aware that the thorium emanation[3] has been tried in phthisis, and it appears that

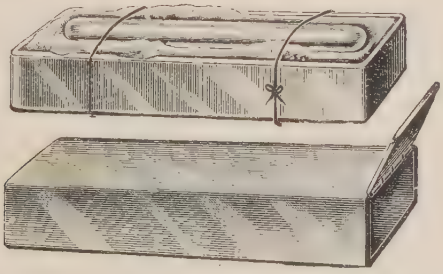
[1] *L.*, 1 | 1904, 675.
[2] *P.J.*, [| 1904, 722.
[3] *L.*, 1 | 1904, 1121.

this has bactericidal properties, and some satisfactory results are recorded.

McLeod [1] has tried radium in lupus vulgaris, both the nodular and verrucose varieties, rodent ulcer, epithelioma, and in two cases of cancer of the cervix uteri. Reports of these last two important cases are still pending. He is convinced that β-rays have the inhibitory effect on bacteria, and, readily passing through glass, have the chief therapeutic value in addition.



It would appear that the rays, like the X-rays, are cumulative in effect, causing a cellular degeneration of weakly resistant



diseased cells, and this, having reached a certain degree, an inflammatory reaction is secondarily produced, and as this occurs in impaired tissue an indolent ulcer is the result.

[1] *L.*, **1** | 1904, 1366.

In rodent ulcers radium acts like a charm—it has been found a valuable adjuvant to the Finsen light and X-rays, and, on account of its small bulk it is useful in positions difficult to get at, such as about the eyelids and the mucous membrane of the nose. Other workers have used radium in psoriasis, epithelioma of the orbit, orbital neuralgia, acute iritis (relieving pain), and in superficial malignant diseases with disappearance of growth, and in cancer of the breast with relief of pain.

MacIntyre[1] has reviewed the recent work on X-rays and radium, and is of opinion that polonium may have importance therapeutically. He tried radium in a sarcoma of the neck, by introducing it in small quantities to the interior of the deeply seated diseased tissue.

Reginald Morton[2] confirms the therapeutic utility of radium, and two cases of cancerous throat are stated by Walsh and Morton to have greatly improved under the rays. The glass tubes, as suggested by Mackenzie Davidson, are undoubtedly the most satisfactory, as they obviate the moistening resulting with mica screens, and applications are made for half an hour every second or third day, according to the activity of the radium.

The Radium Electroscope.

I have here an ingenious little mechanism showing radium doing work. This instrument, a modified form of that devised by Strutt, has a tube of radium supported *in vacuo*. The electro-negatively charged rays penetrate the glass, thus leaving a plus charge behind, which causes the attached aluminium leaves to diverge. When the leaf touches the side of the vessel which is connected to earth it collapses, and commences to charge up again.

It has been arranged by Glew[3] to ring an electric bell at each contact—a coherer, as used in wireless telegraphy, is actuated by each discharge, as you have heard. A description of the coherer and other parts of the instrument may be found in the *Photographic Journal*[4] and in *Nature* for July 14 last.

Seeing that the substance has already proved itself to be of great value as a therapeutic agent, I think the spirit of inquiry

[1] *B.M.J.*, 1 | 1904, 933.
[2] *B.M.J.*, 1 | 1904, 941.
[3] Glew, *Nature*, July 14, 1904, 246.
[4] *Photo. Jl.*, 1899, p. 179.

should lead many chemists to acquire a tube or two so as to become familiar with the properties, and there is every probability that if lent to medical men to try for disease and ailments, that some valuable results may be achieved even quite by chance.

We must not lose sight of the fact that these radio-active bodies are in all probability dangerous poisons acting directly on the nerve centres, and should be classified as such; there will undoubtedly come a time when these elements are administered *per os*, but experiments on animals have already proved that the radium emanation arrests life. It is, indeed, desirable that any revision of existing Poison Laws should be made to carefully include these physical poisons. Toxicologists should have a thorough knowledge of these bodies—if the radium emanation were used for criminal purposes, the excited activity would have to be sought for, and in all probability would not be discovered, whereas if an actual radium salt had been administered, even the ashes of the dead body would show the necessary radio-activity to convict the murderer.

Dr. SYMES said the Conference was very much indebted to Dr. Martindale for bringing this subject before the members. It was one of those things that pharmacists could not all follow or gain all the information about, and Dr. Martindale had brought together a good deal of the work that had been done. He was recently interested by a case brought to his notice by Dr. Taylor, of Liverpool, who had fitted up an elaborate apparatus for the cure of lupus and cancer by light treatment. Dr. Taylor had been treating a case of cancer by electric light, and he found that up to a certain point the patient improved considerably, but beyond that point all improvement ceased. He then tried treatment by radium emanation, and the patient again improved. From that it would seem that when the beneficial effects of electric light treatment were exhausted they were taken up by the effects of radium. He thought that was a case of considerable interest, and showed the advantage of treatment by radio-activity, as compared with the electric light treatment. Dr. Martindale had suggested that pharmacists might have a little radium and lend it, but he thought the cost was prohibitive. With regard to the use of pitchblende, he might mention

that he believed the pitchblende obtained from Cornwall was not of much value, as its radio-activity was very limited. He would like to ask Dr. Martindale if he could give any information as to the relative elimination of helium as radium degenerated in radio-activity. It was a rather curious fact in connexion with radium that its activity increased as the surrounding temperature diminished. It was curious because chemical action went on more rapidly at a higher temperature.

Mr. J. R. Hill thought Dr. Martindale's paper might very well have been given as an evening lecture and demonstration, and would have been of greater advantage and interest than a smoking concert and dance. The subject was one which dispensing chemists would do well to interest themselves in. He found that the medical profession naturally turned to the dispensing profession for help and information in this particular department. He had also found that the dispensing chemist was not so completely in touch with such subjects as he ought to be, and he thought the Pharmaceutical Society had done a wise thing recently in setting aside a room for physical apparatus at Bloomsbury Square. He thought if there was a point on which pharmacists were deficient in information, it was in the region of physics.

Mr. Peter MacEwan regretted that Dr. Martindale had treated so cavalierly Mendeléeff's suggestions as to radio-activity, which had arisen in a remarkable manner. As there is no place in the periodic table for argon and other gases discovered by Ramsay and his colleagues Mendeléeff had arranged a place for those gases in his table. He thus began with helium, a column before No. I., and he had also to find a place for another element, coronium, which exists in the solar corona, the atomic weight of which he estimated to be a mere fraction of the atomic weight of hydrogen. As that element is so light it is not attracted by bodies such as earth, and this led him to the conception that the ether is a material body, having an atomic weight of one-millionth of hydrogen. Consequent on this lightness it is everywhere present, even inter-molecularly, and in constant motion, but it has a slight residual affinity, so that it is temporarily retained by certain bodies, such as radium, and its disengagement from matter accounts for the phenomenon of radio-activity of such bodies as radium. The bubbles on the side of a glass of soda-water gave a fair illustration of the very slight attractive property of ether in relation to other bodies. Dr. Martindale,

in common with others who had given attention to radium, ignored Mendeléeff, and he thought this scarcely fair. He thought they ought to pay attention to suggestions that came from great minds like Mendeléeff.

Mr. CLAGUE said he wished to emphasize in a very marked way the services which had been rendered by Dr. Martindale. With regard to Mendeléeff, he thought they might safely leave him, as they had left Dalton and others, trusting that they would survive the little buzz around their names, and he believed they would come out right. In regard to matter and energy, they might find that they had been somewhat wrong; but, at all events, they had had a good working theory for many years. He was glad to hear that Dr. Martindale thought pharmacists could be of assistance to medical men. As to radium, he came from a neighbourhood where coal was looked upon as energy, and he was not afraid of radium. He thought the vessel that had radium for its motive power was as likely to go to the bottom as to cross to the other side of the ocean. While radium was generally considered to act upon other substances, it was possible that it was being acted upon.

Mr. T. TYRER complimented Dr. Martindale on the value of his paper, and concurred with the remarks of Mr. Hill, though he should be sorry for such a pleasant evening as was usually arranged to be interfered with. Mr. Tyrer then related at some length the story of his connexion with the researches of Sir William Ramsay on thorium and other substances, and described how Mr. Charles T. Tyrer, acting on the suggestion of Ramsay, had extracted helium from a mineral which came from Ceylon. The practicability of extracting the helium in a state of purity depended upon tight joints, and his son, who had engineering experience, was wise and expert enough to utilize a very ordinary piece of apparatus. The helium extracted by means of that apparatus was of such a quality that when it arrived at University College there was no need to use the special apparatus for the purification of helium and similar gases. Mr. Tyrer went on to speak of the analysis of these gases, and of new substances, and said he should not be surprised if Sir William Ramsay had not some new announcement to make at the annual meeting of the Society of Chemical Industry in New York.

Dr. MARTINDALE, in reply, said the pitchblende from Cornwall was, he believed, not of much value: that from other places

had been found to be much richer in radium. With regard to the question of temperature, radium was, perhaps, a degree Centigrade, or so, warmer than the surrounding atmosphere, and it had been shown by various workers that that temperature was maintained even when the temperature of the surroundings had been reduced to that of liquid hydrogen, so that really temperature had not much effect upon its activity. He thanked the various speakers for their appreciative remarks; and, with reference to Mr. Hill's comments upon the physical side of these problems, there was no doubt that the physical questions were of the utmost importance. In working through the treatises of Madame Curie, Soddy, Ramsay, and many others, he was sometimes in great difficulty to master the points which they raised, because his physical knowledge was scanty, and the mathematics were quite beyond the scope of his pharmaceutical chemistry. With reference to Mendeléeff's table, the elements were assumed by scientists to be continually changing. For example, it was even estimated that gold was changed into copper—and that being so, they could not really give figures for those substances. Dr. Martindale concluded his reply by complimenting Mr. Tyrer on the very valuable technical work he had done in connexion with the separation of the crude radio-active substances.

The PRESIDENT, on behalf of the Conference, thanked Dr. Martindale for his paper, which, he said, must have involved an exceptional amount of work and exceptional ability in placing before the Conference the paper in so lucid a manner.

Mr. RUTHERFORD HILL, in the absence of the authors, Dr. L. Dobbin and Dr. A. White, read the following paper :—

A SIMPLE MODE OF PREPARING SYNTHETIC POPULIN.

By LEONARD DOBBIN, PH.D., AND ALEX. D. WHITE, D.SC.

Benzoyl-salicin, or populin, which occurs naturally in the leaves and bark of various species of *Populus*, was prepared synthetically in 1870 by Schiff,[1] who obtained it by three different methods :—

(1) From the product obtained by the prolonged interaction, at a comparatively low temperature, of salicin with a consider-

[1] *Ann. Chem. Pharm.*, 154 (1870), pp. 1 *et seq.*

able excess of benzoyl chloride. Besides populin, this product contained di- and tetrabenzoyl-salicin, together with unchanged salicin and benzoyl chloride, and the isolation of the populin necessitated a long and troublesome series of operations.

(2) From the product obtained by gently heating together salicin and benzoic anhydride until fusion took place, and then permitting the liquid to cool. Boiling water extracted salicin, populin, and benzoic acid from the resulting colourless, glassy mass, and, on evaporating the aqueous extract, benzoic acid and populin crystallized out first. As the latter alone is soluble in ether, it was easily separated from the benzoic acid. The portion of the fused mass which did not dissolve in boiling water consisted of di- and tetrabenzoyl-salicin.

(3) By the reduction (by means of sodium amalgam) of benzoyl-helicin, a substance obtained from helicin by interaction with benzoyl chloride. Helicin itself is a product of the oxidation of salicin by means of dilute nitric acid.

Schiff states that his synthetic populin was identical in its special reactions and in all its physical properties with the natural product, which was carefully examined by Piria,[1] but that it persistently retained the odour of benzoic compounds, whereas natural populin was odourless.

Desiring, some time ago, to prepare populin in considerable quantity, we employed, in the first instance, the second of the Schiff methods mentioned above, as it appeared to be the easiest to carry out. We ascertained that the substance could be prepared comparatively easily by this method, but that the yield was small, owing to the fact that a large proportion of the salicin became converted into the di- and tetra-benzoyl derivatives; and, consequently, we endeavoured to obtain an increased yield by some other method. We found that this could be accomplished satisfactorily by the aid of the Schotten-Baumann reaction,[2] which has been most successfully employed for the introduction of the benzoyl group in other cases, and consists in the treatment of the substance into which it is desired to introduce this group, with benzoyl chloride in presence of aqueous solution of potassium hydroxide.

To prepare synthetic populin on the small scale by aid of this reaction, we dissolved 20 Gm. salicin in a litre of boiling water, cooled the solution, and introduced it into a Winchester quart

[1] *Ann. Chim. Phys.* [3], 34 (1852), p. 278; and 44 (1855), p. 366.
[2] *Ber. Deutsch. Chem. Ges.*, 17 (1884), p. 2,545; 19 (1886), p. 3,218, etc.

bottle. This solution was made alkaline by the addition of potassium hydroxide in small quantity, and 10 Gm. benzoyl chloride was then gradually added from a burette. Only a few drops of the chloride were added at a time, and then the bottle and its contents were shaken vigorously until the added quantity had completely disappeared. A few drops more were then added, and the shaking was repeated, and so on, care being taken to add potassium hydroxide from time to time to prevent the liquid from becoming more than slightly acid at any stage of the addition of the benzoyl chloride. On account of its very sparing solubility in cold water, populin began to separate almost at first, and, by the time the benzoyl chloride had all been added, a bulky precipitate had been deposited. This precipitate was removed by filtration, washed with water, dried, and powdered, and was then extracted with ether, which dissolved some tetrabenzoyl-salicin out of it. The residue, insoluble in ether, was boiled with about a litre of water, and the rapidly-filtered solution deposited, on cooling, a voluminous, finely-crystalline precipitate of populin, which was collected and dried, and was then recrystallized from hot alcohol.

The populin so prepared was pure white and odourless. Its melting point was 180°C., corresponding with that of Piria's natural populin, and, after drying at 100°C., it yielded, on combustion, numbers agreeing with Piria's formula, $C_{20}H_{22}O_8$.

Carried out on a larger scale, and with effective mechanical stirring, the process was found to give most satisfactory results. It is essential, however, that the stirring should be of a very efficient character, since, otherwise, drops of benzoyl chloride very readily become entangled in the precipitated populin, and are not brought properly into contact with the dissolved salicin.

For the sake of comparing our synthetic product with natural populin, a small quantity of the latter (manufactured by Merck from the leaves and bark of *Populus nigra* and *P. tremula*) was procured. This preparation had a very slightly yellowish colour, and was found to melt below 175°C. On recrystallization, however, first from boiling water and then from hot alcohol, a sample was prepared from it which melted at 180°C., and behaved in every other respect exactly as our synthetic sample did.

The PRESIDENT said they might all rest assured that the

synthetic production of many substances like that would be a duty of pharmacists in the very near future. As showing a very ordinary process of producing populin synthetically, he thought the paper was of extreme interest. As the authors were not present, he could not invite queries. The Conference would agree with him that their thanks were due to the authors and to Mr. Hill for reading the paper.

A LIQUID FORM OF LINIMENTUM POTASSII IODIDI CUM SAPONE.

By Hy. Williams Jones, F.C.S.

Linimentum potassii iodidi cum sapone was introduced into the British Pharmacopœia in 1867, on the recommendation of Dr. Rumsey, of Cheltenham, a member of the Medical Council of that period.

The original recipe was given to Dr. Rumsey by Mr. Nathaniel Smith, also of Cheltenham, who copied it from the "form book" of the business with which he was connected. The preparation had been supplied locally for some twenty years previously as "in every way more desirable and efficacious than ung. potass. iodid."

In the Pharmacopœia of 1867, hard soap was directed to be used, and from the variety of results produced by different workers the mode of preparation was generally condemned.

This formula is still given by Squire in his *Companion* as a "non-official" preparation, and with the manipulation there suggested, "a soft white jelly will result and remain so."

It was pointed out by Mr. N. Smith, in 1870, that curd soap was the best variety to use, and the formula given in the *Year-Book of Pharmacy* of that year was adopted as the official one for the respective editions of the pharmacopœias of 1885 and 1898.

I have several times met with queries from medical men and others as to the reason why this liniment still varies in appearance, as sent out by different houses. And a request made some time ago to the firm with which I am connected to supply it in a liquid state caused me to form the opinion that a fluid preparation capable of giving practically identical results by different workers would be desirable.

On first looking into the matter I came across the formula proposed by A. L. Doran, *Chemist and Druggist*, August 28, 1886 (*Year-Book Pharmacy*, **1887,** p. 259), in which soft soap was employed. This was in effect a similar but thinner liniment to that produced by Tichborne's process, in which the "pectising oleate" was formed by the direct combination of oleic acid and potassium carbonate.

As a more liquid preparation was required than that given by Doran's formula, the use of a comparatively strong spirit was the only alternative, and the following formula was found to give a liniment resembling ordinary soap liniment in appearance. Rubbed on the skin it leaves a film which has been considered fully satisfactory in its properties and action.

To shorten the appellation of the liniment, I propose to call this modified form of the official preparation simply—

LINIMENTUM POTASSII IODIDI.
Liniment of Potassium Iodide.

Take—

Soft soap	2 oz.
Iodide of potassium	1½ oz.
Glycerin	1 fl. oz.
Oil of lemon	1 fl. dr.
Alcohol (60 per cent.)	10 fl. oz.

Dissolve the soap—preferably by a gentle heat—in the mixture of alcohol, glycerin, and essential oil. Add the iodide of potassium, and shake till dissolved. Decant, or filter, if necessary, after standing for a few hours.

Mr. WHITE, in opening the discussion, said he thought the gelatinous condition of the liniment was due to the "salting out" of the soap by means of a strong solution of potassium iodide. The reason for the great variation in the appearance of the product was probably due to the variation in the composition of the soap used. That was not always apparent, and they could not always control it by the B.P. tests. The tests in the Pharmacopœia were very good so far as they went, but for this purpose they did not go far enough. The tests for curd soap did not include any examination of the fatty acids—not even the determination of their amount or their melting point or physical properties. They might thus get ten curd soaps answering the official tests perfectly well, and yet behaving

very differently to salt solutions of potassium iodide. Some soaps are precipitated by salt water and some are not, and some by certain salts and not by others. That really was the cause of the variation in the preparation. They would not get over that by using curd soap, hard soap, or soft soap, or any other soap, as such, of approved name. They would have to use a soap which was much more definite in composition. A soap for ordinary commercial purposes need not be very definite, while for washing soap the test might be made very broad indeed without doing any harm, because if they made it very narrow they made the article correspondingly more expensive. But in a preparation of this sort they did not want a soap that would fulfil such a broad test; it must be narrowed down. He did not think they would get that from any commercial variety of soap. They must use some preparation made from some fatty acid by itself, and on that basis they would get a satisfactory formula. It was perfectly simple to make their soap from fatty acids and alkali.

Mr. Gerrard said the paper was a very useful, practical note. While agreeing very largely with what Mr. White had said, he had found some difficulty in getting oleic acid which was uniform in quality. The same difficulty would, therefore, arise in getting a definite soap. They were dependent so much upon manufacturers of these articles, and it was difficult to get them to give exactly what was wanted. Nevertheless, he supported to a very large extent Mr. Jones's view that they could do with an alteration in the formula for the liniment. Years ago he used to think it the sort of preparation that was put in the Pharmacopœia for the benefit of examiners. If they could by any means or other, by using a more definite soap, get a preparation that satisfied the physician and the patient, and did not create confusion in the minds of the pharmacists, he thought the paper would have served a very useful purpose.

Dr. Symes said the preparation mentioned by Mr. Jones had its own peculiar characteristics, and could scarcely be regarded as a substitute for the Pharmacopœia preparation. It was spirituous, and the feature of the Pharmacopœia preparation was that it did not contain alcohol. It was well known that alcohol was used for hardening tissues, and possibly it might have some effect of that kind when applied to the skin. At any rate, an alcoholic preparation would be different in character to the ordinary Pharmacopœia preparation, and although it

might possess a character which was peculiarly its own, he thought possibly there might be room for the two. He did not think the Pharmacopœia preparation was intended merely to upset the equanimity of candidates for examination, but as a useful preparation for the medical practitioner.

Mr. Lothian said, as a teacher who had experience of students making up small quantities of the liniment, he was often appealed to as to what its appearance ought to be. He had never been able to answer that satisfactorily, because the appearance varied a great deal, both according to the soap and according to the manipulator, and the samples of curd soap also varied. Curd soap had been used for the preparation, he gathered, from its very great gelatinizing power compared with ordinary hard soap. If the liniment which Mr. Jones recommended could be substituted, it would be a great advantage, as they would then have a much more uniform preparation than at present. He could not see, from a therapeutic point of view, that there would be any difference; in fact, he thought the new preparation might be more efficacious than the present. He did not agree with Mr. White's explanation as to salting out.

Mr. Brodie recalled an incident which happened just after the publication of the 1867 Pharmacopœia. The late Mr. John McMillan mentioned to the late Mr. T. D. Moffat, at a meeting, that he had had a prescription for linimentum potassii iodidi cum sapone, and wanted to know what appearance it should have. Mr. Moffat, who then had no practical knowledge of the preparation, asked Mr. McMillan, "Had you the prescription first?" "Yes," replied Mr. McMillan. "Then," replied Mr. Moffat, "whoever gets it next and varies it, yours will be the proper thing."

Mr. J. Lawson said the fluid preparation had been a common thing in Dublin for many years. He had not found any great difficulty in making the B.P. preparation, and thought any one would be able to make a cream-like, somewhat frothy product, if he bore in mind two little notes which Professor Greenish was very earnest in impressing upon them when they were at the Square. The first was: be sure to use recently prepared soap; and the second, having dissolved the soap in hot water, be sure that you make up for the loss of water before you proceed to add the soap solution to the potassium iodide. He asked Mr. Jones if his preparation was as thin as the ordinary liniment of soap.

Mr. JONES: Yes, quite. In a bottle it looks exactly like the ordinary soap liniment. If you turned it up it might be just a little thicker. To all intents and purposes, it is quite as liquid as the ordinary liniment.

Mr. LAWSON did not know whether medical men would approve of a very thin preparation, or of one which was a little thicker and more like that which Professor Tichborne sent out. He thought they would perhaps prefer a thicker preparation, as being more convenient for rubbing in. Of course, there was the difficulty of filtering a thick preparation. His method was to dissolve the soap first in a comparatively strong spirit, then filter, and proceed to add the potassium iodide, the glycerin, and the rest. The thick preparation had proved itself very useful across the Channel, and it would tend to uniformity if, in introducing a liquid preparation on this side, it were made somewhat of the same consistence. The frothy product made according to the Pharmacopœia, although it had very little weight, took up a large volume, and if they got a little in the hand the absolute amount of potassium iodide in it was not much. This liquid preparation, however, was much denser, and therefore if they got what appeared to be the same quantity in the hand they would find that they had perhaps twice the quantity of iodide in it. If the one was substituted for the other, the doctor should be notified of its increased strength.

Mr. W. A. H. NAYLOR asked if it was not a fact that the liquid preparation was stocked by wholesalers in this country, and was in regular demand by medical men. That was his experience, and that was the reason why they should have a definite preparation. Therefore they were much indebted to Mr. Jones for bringing the matter forward. He thought the preparation which was in demand was probably a little thicker than the one which Mr. Jones's formula would produce.

Mr. H. E. BOORNE agreed that the preparation was in demand. He was not sure that there was any definite formula published for it. He agreed with Dr. Symes that there might be room for the two formulæ in the next edition of the Pharmacopœia, or perhaps in the "Compendium," and Mr. Jones' formula might be included in that volume. He did not think the liquid preparation could be substituted for the old form, as he was sure that the amount of spirit incorporated in it would make its use of quite a different nature. If a medical man prescribed the

official preparation for certain purposes when considerable friction would have to be used in its application the action on the skin would be quite different if made with 60 per cent. alcohol.

Mr. Alcock said the original prescription was that of a lady who presented it to Mr. Nathaniel Smith to be made up. It was used, as it was now, for housemaid's knee, and for a certain part of the anatomy of a coachman. The lady complained that it was very expensive, and then Mr. Smith turned it from a spirituous preparation to an aqueous one. And then the trouble began.

Mr. Wm. Kirkby thought a liquid preparation was to be preferred, if they could encourage medical men to use it. Where manipulative expertness had to be depended upon there was certain to be a difference. Most of them had their views as to the causes of the variation in the official article, but it was significant that if prepared under the supervision of one man, and by his method, a uniform preparation could be obtained.

Mr. MacEwan said the cause of the variation was due to the 1867 Pharmacopœia, the compilers of which had excluded the "character and test" of the curd soap recommended by Mr. Smith, viz.—"the white curd soap made by Messrs. Gibbs, of the City Soapworks, or Benbow's curd soap."

Mr. J. C. Umney agreed with what had been said with regard to the deficient monographs of soaps. The proper chemical character of a white curd soap were : —Limit of moisture, 28 per cent. ; melting point of fatty acids, 43° to 44°C. ; percentage of fatty acids, 64. The same remark applied to the Pharmacopœia monograph of oleic acid, which practically was not complied with by any of the oleic acid of trade.

Mr. Clague said experience in the Midlands led people to believe that if they got uniformity in this preparation it would be the worst thing for them. They were obliged there to keep the creamy preparation to suit certain doctors, and the frothy preparation for others who preferred it. Now they had got to the point where a liquid was necessary. He hoped, for many reasons, that Mr. Jones would go forward with the work and try to get such a preparation. He did not think it would in any sense displace the other two. Perhaps the best plan would be to sell the creamy preparation by weight and the frothy one by measure.

Mr. Jones, replying on the discussion, expressed his pleasure that his short paper, on a purely pharmaceutical subject, had

received so much attention. As far as he could gather, all the remarks pointed to the fact that some liquid form of the preparation was desirable.

The PRESIDENT, in calling for a vote of thanks to Mr. Jones, said the paper pointed very clearly to the necessity for some kind of supplement to the Pharmacopœia. They heard that there was a large demand for the liquid preparation, which had apparently superseded the creamlike product described in the Pharmacopœia.

The thanks of the meeting were heartily accorded.

THE DISTRIBUTION OF FAT AND STRYCHNINE IN NUX VOMICA SEEDS.

By H. WIPPELL GADD, F.C.S., AND SYDNEY C. GADD.

In common with other manufacturers, we have had some trouble in making the official liquid extract of nux vomica, on account of the fat which the seeds contain. Various suggestions have from time to time been made to overcome this difficulty, but chiefly for the treatment of the finished product. It was, however, suggested, more than twenty years ago, by T. E. Greenish, that the fat should be removed from the drug by a preliminary percolation with benzol. Such a process would obviously be troublesome and expensive on the manufacturing scale, and we are not aware that it has ever been used.

Some time since we had occasion to grind a quantity of nux vomica seeds (A) for manufacturing purposes. This we did by first steaming the seeds to soften them, and then passing them through a Carter's disintegrator. The centrifugal action of the disintegrator separated the light hairs from the heavier particles which make up the bulk of the seeds, and it was suggested that it might be advantageous to reject these hairs, as they probably contained more fat than did the remainder of the seeds. Before doing so, we took samples of the hairs (which amounted to about 5 per cent. of the whole) and of the rest of the powder, and examined these samples by the following methods :—

(1) A portion of each sample was freed from fat by prolonged treatment in a Soxhlet tube with boiling ether, with the following results :—Percentage of fat found in hairs, 7·0 ; percentage of

fat found in remainder of the seeds, 2·0; percentage of fat in whole seeds (by calculation), 2·25.

(2) Another portion of each sample was examined for strychnine by Bird's process (*Pharmaceutical Journal* [4], **11,** 574) with the following results :—

Percentage of strychnine in hairs	0·5
Percentage of strychnine in remainder of seeds	1·5
Percentage of strychnine in whole seeds (by calculation)	1·4

From these results it was obvious that by rejecting the hairs a considerable portion of the fat would be removed, whilst the loss of strychnine would be immaterial. A liquid extract was, therefore, made from the seeds (in No. 20 powder), from which the hairs had been removed.

The liquid extract was made by the official process, but the percolation was continued until the product ceased to give a precipitate with the usual alkaloidal reagents. The weaker percolates were concentrated and the finished product adjusted to the strength of 1·5 per cent.

The amount of fat in the liquid extract was then estimated by the following method : The extract was evaporated almost to dryness, and the residue ground with powdered glass. The fat was extracted by treating the mixture with boiling ether in a Soxhlet tube, with the following result : Percentage of fat in liquid extract, 0·62. It was, therefore, evident that the amount of alcohol (70 per cent.), which was sufficient to extract the whole of the strychnine present in the seeds (freed from hairs), only removed one-third of the fat. The liquid extract made thus was of excellent quality, and free from any objectionable amount of fat. This result, however, was not in itself conclusive, as it will be noticed that the seeds contained rather less than the average amount of fat.

The opportunity not immediately occurring of making further experiments on the manufacturing scale, the following experiments were made on small quantities : Some nux vomica seeds (B) were taken, and after being well steamed, were decorticated by hand. The decorticated seeds were found to amount to about 86 per cent. of the whole. The hairs and skins were found to amount to about 14 per cent. of the whole.

The fat and strychnine were then estimated as before, with the following results : Decorticated seeds, fat, 3·5 per cent. ; strychnine, 1·5 per cent. ; hairs and skins, fat, 1·5 per cent. ;

strychnine, 0·9 per cent.; whole seeds (by calculation), fat, 3·25 per cent.; strychnine, 1·4 per cent.

Small quantities of liquid extract were then made from each of these samples. The official method was strictly followed, but no attempt was made to thoroughly exhaust the seeds, nor were the finished products adjusted to the strength of 1·5 per cent.

The following results were obtained; Sample B (whole seeds, No. 20 powder).—The liquid extract made from this sample contained: Fat, 0·84 per cent.; strychnine, 0·95 per cent. Therefore, the amount of alcohol (70 per cent.) required to extract two-thirds of the strychnine removed one-fourth of the fat.

Sample B1 (decorticated seeds, No. 20 powder).—The liquid extract made from this sample was found to contain: Fat, 0·67 per cent.; strychnine, 1 per cent. Therefore, in extracting two-thirds of the strychnine, only one-fifth of the fat was removed.

Sample B2 (skins and hairs).—The liquid extract made from this sample was found to contain: Fat, 1 per cent.; strychnine, 0·5 per cent. Therefore, in extracting five-ninths of the strychnine, two-thirds of the fat were removed.

These results confirm the experiments made on sample A, but presuming that the hairs contain about as much fat as do those of sample A, the skins must contain very little, if any, and therefore there is no advantage in rejecting them.

Further experiments were made on another sample of seeds (C). The seeds were found to contain: Fat, 4·5 per cent.; strychnine, 1·5 per cent.

A portion of the seeds was taken, and the hairs carefully scraped off, without removing the skins. The scraped seeds were found to contain: Fat, 4·3 per cent.; strychnine, 1·52 per cent. The hairs were found to contain: Fat, 8 per cent.; strychnine, 1·0 per cent. Liquid extracts were then prepared from these as above.

Sample (C1) (scraped seeds, No. 20 powder): The liquid extract made from this sample was found to contain: Fat, 0·8 per cent.; strychnine, 1·16 per cent. Therefore, the amount of alcohol (70 per cent.) required to extract three-fourths of the strychnine only removed about one-fifth of the fat.

Sample (C2) (hairs): The liquid extract made from this sample was found to contain: Fat, 1·72 per cent.; strychnine, 0·33 per

cent. Therefore, the amount of alcohol (70 per cent.) required to extract one-third of the strychnine removed one-fourth of the fat. There was, however, a source of error in this last experiment, as the supply of liquid extract running short, the strychnine was determined on the residue left after the removal of the fat, and strychnine not being entirely insoluble in ether, there was probably some loss of the alkaloid.

We intend continuing these experiments, but publish the results obtained so far now, in the hope that other workers will contribute such facts and figures as have come to their notice. We think, however, that we are justified in drawing the following conclusions :—

(1) That the hairs of nux vomica contain proportionately much more fat and less strychnine than do the inner portions of the seeds.

(2) That the fat is more readily removed by alcohol (70 per cent.) from the hairs than from the denser portions of the seed.

(3) It follows, that the hairs can be rejected with advantage before making the liquid extract.

The PRESIDENT said the paper had involved a large amount of research of a very practical character.

Mr. ALCOCK suggested that Mr. Gadd should be careful to see whether his fat was acid or neutral. He (Mr. Alcock) had made a great number of experiments in the matter, and he found there were two kinds of fat—one easily extracted by alcohol and one more easily extracted by ether.

Mr. J. C. UMNEY said the best method for the removal of fats, whether neutral or acid in character, was the process of a French worker, which consisted in treating the extract with melted paraffin wax to mechanically remove the fats, the layer of which, on solidification, could be removed without difficulty.

Mr. GERRARD said any extract which contained fat should be thinned with a solvent, and shaken with warm petroleum ether, which would remove the fat from the substance. The fat was easily removed in that way, and it was a simple, most effective, and most economical process.

Mr. H. W. JONES said he had used for the removal of the fat from this particular extract both warm petroleum ether and also a solid paraffin. He thought the advantage lay with the solid paraffin, because, after warming, it simply congealed

together with the fat, and could be washed with distilled water. It was a very simple method, but a good amount of paraffin wax was necessary in order to get the substance to cake.

Mr. White asked how Mr. Gadd proposed to get the hairs off. He thought the only effective means of removing the hairs was to gently rotate the seeds in the disintegrator.

Mr. Brewis congratulated Mr. Gadd on his exceedingly interesting paper, and on the careful work done in separating the fats.

Mr. Ransom said the paper was of considerable interest; especially was it of interest to know that there was so much more fat in the hairs than in the seeds. But he doubted whether it would be worth while to remove the hairs from the seeds. A process had been devised by which the fat could be removed from the extract, and this would be more economical than removing the hairs in the first place.

Mr. Gadd, in reply, said they were at first diffident about publishing this note, because they felt that the results obtained were from such a small number of samples that it was not fair to generalize. He was much obliged to Mr. Alcock for his suggestion regarding the nature of the fats. Some of the other speakers—especially Mr. Umney—had referred to processes for the purification of the extract, but that seemed to him to be the wrong way to go about the matter of purification; why not purify the drug? With reference to Mr. White's remarks as to the removal of hairs, his difficulty had been to keep the hairs on. His attention was first directed to the matter by Mr. Walter Sayer, a laboratory assistant, who pointed out that the centrifugal action of the disintegrator had carefully separated the hairs from the seeds, and he asked whether they should be mixed with the seeds, or should he reject them, as they probably contained most of the fat and very little strychnine. So the hairs were examined and then rejected, and that was the genesis of the whole note.

The thanks of the Conference were accorded to the authors for their paper.

COMPRESSED TABLETS.

By Henry Rodwell,

Pharmaceutical Chemist.

In a previous paper by E. White and the author of this paper, oil of theobroma was recommended as the granulating and lubricating agent or excipient, which was to be applied in two ways : (1) in the form of an aqueous emulsion, for such substances as do not form masses of a pill-like nature when moistened with water ; (2) as an ether or ether-alcohol solution applicable to such substances as aloes and cascara, which *do* form tough masses with water. Cane-sugar was recommended as the diluting material.

In the former communication[1] some details were omitted which will be given here, together with such modifications of the general method as further experience has proved to be either advantageous or necessary.

Granulation.

The ease with which any material can be worked into tablets depends, as a rule, upon the degree of success attained in granulation. Certain modifications of the general method will be given, to be applied in special cases. Some remarks upon the general principles of granulation are necessary, however, before their use can be properly indicated. The cohesiveness of a tablet depends, in some degree, upon the interlocking of the granules on compression, but chiefly upon the inherent cohesiveness of the material. The tendency to cohere may be increased by the addition of sugar, glucose, or acacia. Sugar should be employed whenever possible, but since a comparatively large proportion is usually necessary for the purpose, its use is limited. When, say, 5 grains of medicament is to be presented in tablet form, especially if it is of the nature of phenacetin, aspirin, or quinine sulphate, the addition of sugar in sufficient quantity is not possible without producing too large a tablet. In the former paper the use of a small proportion of glucose was recommended as a means of making the material more cohesive and of allowing some reduction in the proportion of sugar. It has been found that by increasing the proportion of

[1] *Y.B.P.*, 1903, p. 487.

glucose to from 5 to 8 per cent. the sugar can be omitted entirely, and 5 grains of medicament presented in a six-grain tablet.

The following formula is typical :—

Phenacetin	64 parts.
Starch	4 parts.
Glucose	6 parts.
Theobroma emulsion	13 parts.

The glucose may be incorporated by first mixing it with the emulsion in a mortar.

Good granules possess a certain degree of stability, showing no tendency to break down into powder under manipulation. When defective in this quality, gum acacia should be added in the proportion of from 5 to 10 per cent.

The following formula is improved in this way :—

Reduced iron	16 parts.
Gum acacia	2 parts.
Starch	1 part.
Sugar	4 parts.
Theobroma emulsion	2 parts.

The addition of gum acacia to the formula for Hutchinson's pills given in the previous paper is an improvement. Gum acacia is a necessary ingredient also in the formula for iron tablets, which will be given later; as might be expected, the presence of a dehydrated salt interferes considerably with the operation of granulation.

In applying the ether-alcohol form of the excipient two modifications are recommended for use on occasion: (1) The substitution of a weaker alcohol when granulation, produced with the stronger alcohol, is imperfect. The modification is employed in the following formula :—

Opium	16 parts.
Sugar	7 parts.
Ether-theobroma	3 fl. parts.
Alcohol (60 per cent.)	2 fl. parts.

Mix the powders and add the liquids separately.

This modification can be adopted in most, if not in all cases, when from the nature of the material the use of the aqueous emulsion is indicated; since granules prepared with the ether-alcohol excipient can be more quickly dried, a saving of time is in this way possible. (2) The reduction, in some cases, of the proportion of alcohol. The use of a volume of 90 per cent.

alcohol equal to that of ether-theobroma frequently necessitates the addition of a considerable proportion of sugar, which can be reduced if this modification is adopted. The following is an extreme example :—

Cascara extract	16 parts.
Ether-theobroma	3 fl. parts.
Alcohol (90 per cent.)	0·5 fl. part.

In the formula for cascara given in the previous paper 50 per cent. of sugar was necessary, in order to avoid over-granulation. In such cases as the above a little starch can be added with advantage.

Drying the Granules.

If the drying of granules is carried out in a room which is fairly warm and dry, the application of heat will seldom be necessary. In no case is it necessary to subject the material to a higher temperature than 45°C. No rule can be laid down, even in particular cases : but, seeing how seldom heat is necessary, it is advisable, first, to try drying by exposure to the air. There is the danger with some substances of over-drying, thereby reducing the cohesiveness of the material. The weight of the dry granules will depend considerably upon the temperature at which drying has been conducted, especially if starch or such a crystalline substance as lead acetate is an ingredient of the mixture. To ensure accurate dosage it is necessary in all cases to weigh the finished granules, adjusting the weight of the tablets accordingly. Two samples of ordinary starch powder heated in a water-oven were found in each case to lose 10 per cent. of their weight : a similar loss resulted at a temperature of 45°C.

Disintegration.

To bring about rapid disintegration of tablets which are composed largely of insoluble substances, 5 per cent. of starch powder should be added, applied either by dusting it over the dry granules, or, better, by adding it to the material before granulation. The addition of starch before granulation makes it necessary to add a larger proportion of the excipient : this is generally beneficial, the extra lubricant improving the finish of the tablets ; this addition can be frequently made with advantage. The following formula for grey powder is an improvement on that given in the former paper. The extra

lubricant makes it possible to produce tablets with a good surface by the application of a low degree of pressure.

Grey powder	16 parts.
Starch	4 parts.
Sugar	20 parts.
Theobroma emulsion	4 parts.

For remarks on the compression of this substance reference should be made to the former paper.

Compression.

In adjusting the degree of pressure due regard must be paid to disintegration. Increase of pressure *does* add to the good appearance of the tablets, improving the polish of the surface, and, when the tablets are coloured, making them darker and apparently more homogeneous in composition, but, unfortunately, with a corresponding increase in the time taken by the tablets to disintegrate. Good finish, with the minimum of pressure, is however, possible, and its achievement should be constantly aimed at.

One of the difficulties sometimes encountered is the cracking of the tablets after compression, but only in cases of imperfect granulation : it may, however, be caused by the presence in the material of coarse particles, especially crystals. This should be carefully avoided ; all the ingredients should be in the finest possible powder. This is necessary, also, in the case of coloured tablets, if an appearance of homogeneity is desired.

Another difficulty sometimes met with is adhesion of the material to the punches during compression ; it results from a lack of cohesiveness in the material, the remedying of which has already been discussed. Should adhesion occur when granulation is satisfactory, showing generally that the material is sufficiently cohesive, the remedy will usually be found in more perfect drying. Various methods of correcting adhesion have from time to time been suggested, such as the addition of talc to the dry granules, or by spraying them with an ethereal solution of liquid paraffin, these substances serving also as lubricant. Talc, in very fine powder, has been found useful in cases of emergency, when time did not permit of more elaborate treatment ; but its general use as a lubricant is not recommended, since it increases the liability to crack. If granules prepared with theobroma are found to require additional lubricant, 0·5 per cent. of talc will usually be sufficient. When talc is added

to correct adhesion, as much as 2 per cent. may be necessary; this proportion should not be exceeded. Talc is most economically applied as follows: Spread the granules in a thin layer on paper, and sift the talc over the surface, using a very fine sieve; mix roughly by lifting the corners of the paper, and complete by rotating in a large flask or bottle. In case of adhesion the punches should be washed with water, the lower punch being first removed for the purpose. If the punches are not kept well polished, the difficulty will frequently arise from that cause; when not in use they should be immersed in liquid paraffin or paraffin oil.

As the result of further experimenting on iron tablets, the following formula has been adopted as a substitute for Pilula Ferri B.P. :—

(*a*) Dried ferrous sulphate	150 parts.
Gum acacia	25 parts.
Sugar	125 parts.
Theobroma emulsion (acacia)	60 parts.

Granulate and dry thoroughly by the application of heat.

(*b*) Sodium bicarbonate	150 parts.
Theobroma emulsion (acacia)	35 parts.

Granulate and dry thoroughly with heat, and mix two parts of (*a*) with one part of (*b*). Each 5-grain tablet yields on moistening 1 grain of ferrous carbonate.

Theobroma emulsion, prepared with gum acacia, is preferable in this case to one made with soap: the above calculations are based on one giving a 40 per cent. residue on drying. Absolute drying of the granules is necessary, otherwise the reaction between the salts takes place to some extent, and oxidation ensues. Tablets made from the above formula have been exposed for three months to the trying atmosphere of the general laboratory, without any further change than a slight discoloration of the edges; some of the same batch were coated and have kept perfectly. If it is wished to obviate the labour of coating, which really is not necessary, so far as their keeping properties are concerned, it should not be difficult to find some suitable colouring substance, which might be incorporated before granulation. It is also necessary to examine carefully the dried ferrous sulphate, as many commerical samples do not comply with the official requirements.

Mr. Jones said the point for workers on compressed tablets to aim at was to bring about rapid disintegration, and he believed that 5 per cent. of starch powder mixed with the drug helped to break up the tablet when it came in contact with water. Of course, at one time the mixing of starch with the drug was the exclusive property of one firm, but it did not take long for others to learn the secret by means of the microscope. The action of the starch was very remarkable, and it was due to its absorbent character. Mr. Jones also mentioned the affinity of starch for water in connexion with the removal of water from essential oils.

Mr. Naylor said he might mention, as showing the necessity for such a paper as that under discussion, that after hearing the paper by Messrs. White and Rodwell, which was read at the Bristol meeting last year, he procured several samples of tablets and tested them by placing them in water. He found that in many instances, chiefly with tablets containing insoluble ingredients, that a tablet would remain in water from 48 hours up to 3 days without showing the slightest sign of disintegration. He had tried a large number of published formulæ, and he much regretted to say that he regarded those which had been published as unsatisfactory. Therefore, if the formulæ before the Conference would produce tablets of insoluble substances which would disintegrate rapidly—which was what medical men desired—the paper by Mr. Rodwell would, he hoped, be of great advantage to pharmacists.

The thanks of the Conference were heartily accorded to Mr. Rodwell for his paper.

A CORRECTION SCALE FOR THE DIMMOCK-BRANSON URIC ACID PROCESS.

By F. W. Branson, F.I.C.

The divisions on this scale are intended for a gas volumeter graduated to a twentieth part of a cubic centimetre, which renders the apparatus very suitable for the determination of uric acid, urea, and strength of hydrogen peroxide, etc. The graduations for uric acid are the result of a number of experiments with bulked normal urines, a mean content of 0·006 per cent. of uric acid being assumed. Dilutions of the standard with distilled water were used to obtain the lower divisions of

the scale, and for the higher figures additions of known quantities of pure sodium urate. Check determinations with duplicate samples (the mean of two experiments) as carried out by the Clinical Research Association gave 0·065 per cent. of uric acid. Gerrard's scale for non-diabetic urine was used as a basis for calculating the graduations for urea.

To Correct a Reading for Pressure and Temperature.

Read on the scale to right the observed number of c.c.'s.

1. Follow the horizontal line along to point of intersection of the vertical headed by the observed barometic pressure, reading between the lines where necessary.

2. From this point of intersection follow the oblique line to the right or left to the point where it intersects the vertical of 760 mm.

3. Follow the horizontal line to the point of intersection with vertical of observed temperature.

4. Continue again along the oblique line to the left to the vertical number 0°C. The reading of the c.c.'s taken at this point is the volume of gas corrected to normal pressure and temperature.

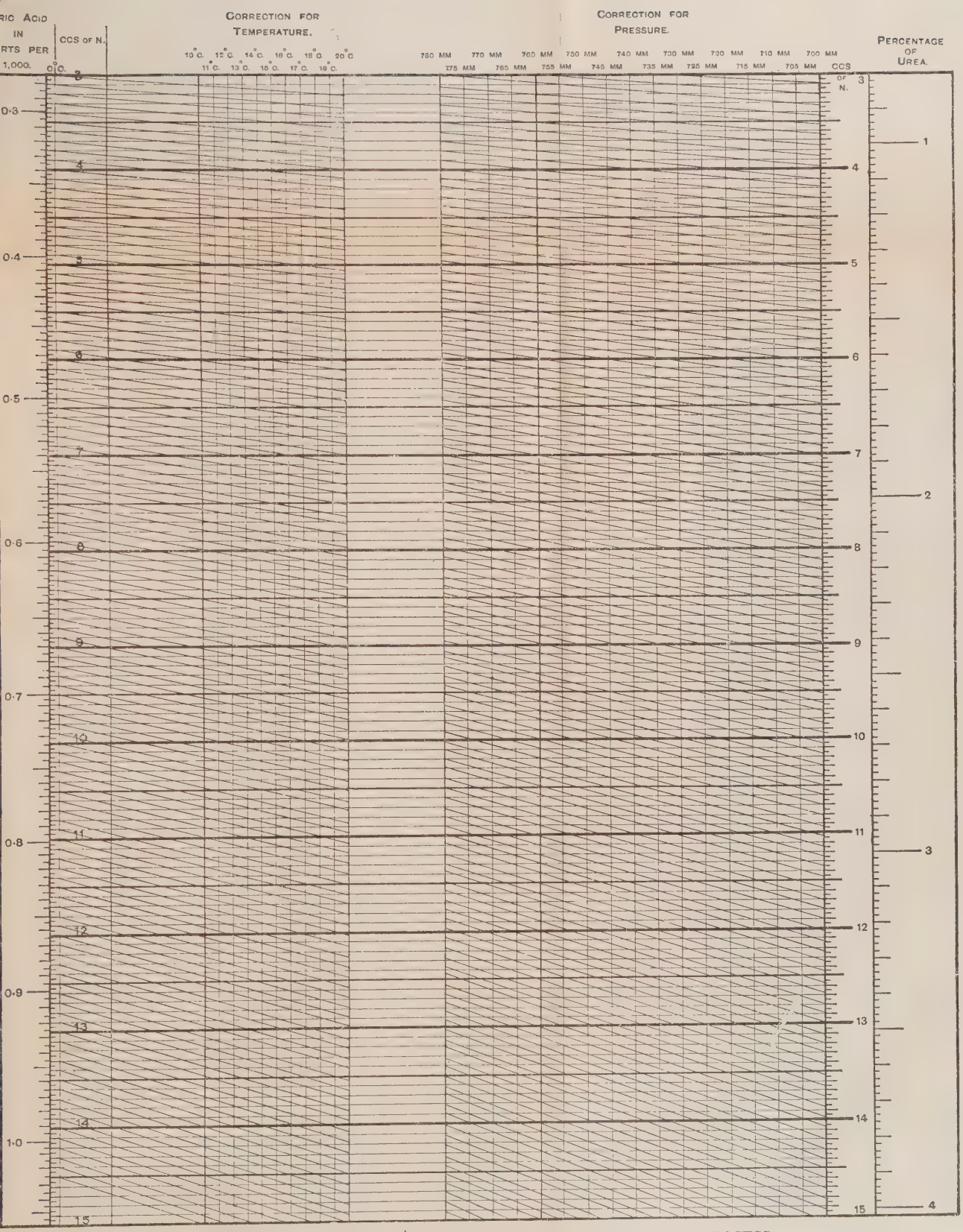
The figures on the scale for urea have been calculated for 1 c.c. of urine, but should the percentage of urea be low a larger quantity may be taken and the necessary correction made.

CHEMICAL EXAMINATION OF GYMNEMA LEAVES.

By Frederick B. Power, Ph.D., and Frank Tutin.

Gymnema sylvestre, Br., from which the leaves under consideration are obtained, is a shrubby, climbing plant, belonging to the family of Asclepiadaceæ, and indigenous to Banda and the Deccan Peninsula (compare *Pharmacographia Indica*, **2**, 450). Although various medicinal properties have been attributed to this plant by the Hindus, it was brought more prominently to notice several years ago in consequence of the observation that the leaves, when chewed, have the property of rendering imperceptible the sweet taste of sugar and other saccharine substances, and also, but in a less marked degree, the taste of many bitter substances.

The leaves appear to have been first chemically examined by Hooper (*Pharm. Journ.*, 1887, **17**, 867, and *Chemical News*,



CORRECTION SCALE FOR THE DIMMOCK-BRANSON URIC ACID PROCESS.

To face page 526.

1889, **59,** 159), and no subsequent publication is known to us in which the chemical nature of their constituents has been made the subject of further study.

In a summary of the investigation by Hooper (*loc. cit.*) the following principal products are stated to have been obtained :—

(1) An ether extract, containing chlorophyll and resins.

(2) An alcoholic extract, containing *gymnemic acid,* tartaric acid, glucose, a neutral bitter principle, resin, etc.

(3) An aqueous extract, containing gum, glucose, carbohydrate, and extractive.

The above-mentioned peculiar properties of the leaves were attributed to the substance designated as "gymnemic acid," which was stated to exist in them as a potassium salt, and to be best prepared by treating an aqueous solution of the alcoholic extract with a mineral acid, washing the precipitate, and drying it in a current of hot air or in a desiccator. The characters of the substance thus obtained were described essentially as follows (compare *Chemical News,* 1889, **59,** 159) :—

"Gymnemic acid is a brittle, black, resinous substance, of a greenish colour when reduced to powder. It is insoluble in water, but soluble in alcohol, ether, benzol, and chloroform. With the caustic alkalies it affords fine red solutions, from which it is re-precipitated on the addition of acids. It fuses at about 60°C. into a black liquid of thick consistence ; above 100° it gives off creosotic fumes, and, at a higher temperature, burns with a bright, smoky flame, leaving no ash. It is precipitated by the salts of lead, iron, silver, barium, and calcium, but not by tannin, picric acid, and gelatin solution. It forms insoluble salts with alkaloids, and this accounts for its masking the taste of quinine and other bitter substances. From analyses of the acid, the formula $C_{32}H_{55}O_{12}$ may be deduced."

"The silver and lead salts of gymnemic acid form black powders, and the analysis of these affords evidence that the acid is monobasic, while the amount of alkali required for its neutralisation indicates a molecular weight corresponding to the above formula. The acid or its salts have not been obtained in anything approaching a crystalline condition ; they dry as do tannic acid and the tannates. The acid is a glucoside. After boiling for about an hour with dilute acid, a dark resinous mass, devoid of the peculiar property of gymnema leaves, remains, and the liquid contains a body which readily reduces Fehling's solution."

It has, furthermore, been noted by Hooper that "chloroform agitated with an alkaline solution of the leaf left a crystalline residue of a brownish colour; it had a bitter taste, and acted as a sialagogue. With the ordinary alkaloidal reagents it afforded coloured precipitates, but was a neutral principle."

The action of the leaves of *Gymnema sylvestre* on the sense of taste was investigated several years ago by L. E. Shore, of Cambridge, whose results are recorded in a paper, entitled, "A Contribution to Our Knowledge of Taste Sensations" (*The Journal of Physiology*, 1892, **13**, 191–217). From a large number of experiments in this direction the following conclusions were drawn :—

"It is accepted that tastes may be divided into four classes, namely, sweet, bitter, acid, and salt, and as examples of these, glycerin, quinine sulphate, sulphuric acid, and sodium chloride were employed. By the action of gymnema the sweet taste is very readily prevented in all regions of the tongue. The bitter taste is easily prevented, but not so readily as the former, especially at the back of the tongue. Acid taste, in dilute solutions, is not affected at all. Salt taste is very slightly, if at all, influenced. It therefore possesses a marked differentiating action. Solid saccharin, placed on the tongue, is tasteless after the action of gymnema; with a solution of quinine sulphate (1 : 1000) a slight acid taste is noticed at the tip of the tongue. The taste excited by the action of socotrine aloes is a pure bitter. Very dilute solutions of picric acid are intensely bitter at the back of the tongue, but after the action of gymnema even a saturated solution excites no sensation. The taste of a very large number of substances used in ordinary life is but little affected by gymnema, only such bitter and sweet components as are present being removed. It does not seem to have so ready or so powerful an action on bitter as on sweet taste; the reverse seems to be the case with cocaine. The action of gymnema on tactile perception, such as induction shocks, is very slight. It has no action on pain. The prick of a needle excites the same sensations."

"The action of gymnema is therefore believed to be best explained by supposing that the nerve fibres or nerve endings capable of being stimulated by pure sweet and bitter substances are different from those which are excited only by acid and salt. The selective action of cocaine, not only on the nerve endings concerned with taste, but on others associated with more

general sensory impressions, points also to the multiplicity of the kind of endings of sensory nerves in the tongue. The more powerful action of cocaine on bitter taste than on sweet, and of gymnema on sweet taste than on bitter, may also be an indication that the nerve fibres or nerve endings concerned with these tastes are also distinct."

Experimental.

The present state of information respecting the constituents of gymnema leaves, as outlined in the introductory portion of this paper, suggested the desirability of subjecting them to a more complete examination. It seemed, moreover, of particular interest to determine somewhat more precisely the chemical character of the substance designated as "gymnemic acid." For this purpose we were supplied with a large quantity of the leaves, which had been freshly gathered in India, and dried by exposure to the air.

It has been noted by Greshoff (*Ber. d. deutsch. chem. Ges.*, 1890, 23, 3548) that the leaves of *Gymnemalatifolium*, Wall., contain a large quantity of amorphous amygdalin, but no hydrolysing enzyme, and therefore that no hydrocyanic acid is developed in contact with water or even by heating with dilute sulphuric acid. In contact with emulsin, however, it was observed that hydrolysis was quickly effected, and that the distilled liquid then contained hydrocyanic acid and benzaldehyde. This behaviour of the substance is very remarkable, inasmuch as amygdalin is known to be readily hydrolysed by heating with dilute mineral acids.

With consideration of the above observation, a portion of the leaves of *Gymnema sylvestre* was tested for a cyanogenetic compound, but neither by contact with water nor by the action of dilute acids or emulsin was any hydrocyanic acid developed.

In order to ascertain the general character of the constituents of the leaves, the following preliminary experiments were made.

Fifty grammes of the ground leaves were extracted successively in a Soxhlet apparatus with various solvents, when the following percentages of extract, dried at 100°C., were obtained :—

(1)	Petroleum (b.p. 40–60°C) . .	gave 2·34 per cent.
(2)	Ether	gave 1·16 per cent.
(3)	Chloroform . . .	gave 0·88 per cent.
(4)	Alcohol	gave 17·02 per cent.
	Total	21·40 per cent.

The petroleum, ether, and chloroform extracts were resinous in character, and insoluble in water. The alcoholic extract was soluble in water, affording a solution which gave an abundant precipitate with mineral acids, a dark coloration with ferric chloride (not due to tannin), and reduced Fehling's solution. All the extracts were very dark in colour and were free from alkaloid. A special test for alkaloids was also made by digesting a portion of the leaves with Prollius' fluid, but with a negative result. The leaves, after complete extraction with alcohol, were treated with boiling water, which, however, removed only gum, colouring matter, and other indefinite substances. The air-dried leaves yielded, on ignition, 8·6 per cent. of inorganic residue, which was found to contain: CaO, 19·3 per cent.; Fe_2O_3 and Al_2O_3, 17·9 per cent.; MgO, 2·7 per cent.; the remainder consisting chiefly of alkali carbonates with traces of manganese and silica.

The above-mentioned alcoholic extract yielded, on ignition, 0·59 per cent. of inorganic residue, which contained all the metals identified in the leaves.

For the purpose of a complete examination of the constituents of the leaves a large quantity of them was extracted by continuous percolation with hot alcohol. After removing the greater part of the alcohol by distillation, a quantity of water was added to the concentrated extract, and the mixture heated on a water-bath in order to eliminate the remainder of the alcohol. A soft, dark green resinous mass was thus obtained, amounting to about 5 per cent. of the weight of the leaves. For subsequent reference this substance may be designated as (A).

To the filtrate from the above precipitate diluted sulphuric acid was added in slight excess. This precipitated a quantity of a dark-coloured resinous substance, which amounted to about 17 per cent. of the weight of the leaves. It was separated from the liquid and washed with hot water until free from mineral acid. In the subsequent description of its properties it will be designated as (B).

The acid filtrate from (B) was shaken with chloroform, which removed only a very small quantity of resinous substance. It was then made alkaline with barium hydroxide, the precipitate of barium sulphate removed by filtration, and the liquid again shaken with chloroform, when only a little resinous substance was obtained. The alkaline liquid was then neutralized, concentrated, and an excess of basic lead acetate added, which

produced a bulky, bright yellow precipitate. This was collected on a filter, washed with a little water, and then suspended in water and decomposed by hydrogen sulphide. The liquid filtered from the lead sulphide was concentrated under diminished pressure, when a brownish-yellow, amorphous substance was deposited, which was not again readily soluble in water. As it resisted all attempts to obtain it in a crystalline state, it was not further examined.

The filtrate from the lead acetate precipitate was treated with hydrogen sulphide for the removal of the lead, filtered, and concentrated under diminished pressure. The examination of this liquid will be described under (C).

(A) *Examination of the Resin separated by the addition of Water to the Alcoholic Extract of the Leaves.*

This product was a soft, greenish-coloured mass. A portion of it was mixed with sawdust, dried, and extracted successively with the following solvents :—

(1)	Petroleum (b.p. 40·60°C.) .	extracted 78·75 per cent.
(2)	Ether . . .	extracted 6·25 per cent.
(3)	Chloroform . . .	extracted 1·87 per cent.
(4)	Ethyl acetate . . .	extracted 4·37 per cent.
(5)	Alcohol . . .	extracted 8·12 per cent.
	Total . .	99·36 per cent.

The petroleum extract was a dark, brownish-green, soft solid. A quantity (238 Gm.) of it was boiled for some time with an alcoholic solution of potassium hydroxide (60 Gm.), the alcohol then removed and water added, when nothing separated. The aqueous solution, which had not the character of a soap, was extracted repeatedly with ether. The ethereal liquids had a yellow colour, and, after the removal of the ether, afforded a crystalline residue. This was distilled under 20 Mm. pressure, when a clear liquid was obtained, which rapidly became crystalline. The boiling point of the substance was evidently very high. It was finally re-crystallized several times from ethyl acetate, when about 3 Gm. of the pure substance were obtained in the form of nearly colourless, pearly leaflets, melting at 68°C.

On analysis :—

0·1072 gave 0·3338 CO_2 and 0·1406 H_2O. C=84·9 ; H=14·6.

$C_{31}H_{64}$ requires C=85·3 ; H=14·7 per cent.

The substance was thus found to be a hydrocarbon, and to correspond in its characters to *hentriacontane*, the melting point of which is given as 68·1.° It is of interest to recall the fact that the same hydrocarbon was found quite recently in the seeds of *Brucea sumatrana* (Power and Lees, *Year-Book of Pharmacy*, **1903,** p. 512), but otherwise it has only been known to occur in nature in beeswax.

The liquid from which the hentriacontane had been extracted was acidified with sulphuric acid, when a large amount of black tarry matter was precipitated. After distilling off the volatile acids in steam, the liquid was shaken with ether, which removed a quantity of soft, black amorphous substance, from which nothing crystalline could be obtained, and which apparently consisted simply of an acid resin. The volatile acids were converted into a barium salt, the solution of which gave the reactions characteristic of *formic acid*, and when acidulated with sulphuric acid developed a strong odour of *butyric acid*. A portion of the crystallised salt was dried and analysed :—

0·3192 gave 0·3456 $BaSO_4$. Ba=52·0 per cent.

As barium formate requires 60·4 per cent. Ba, and barium butyrate 44·1 per cent. Ba, the substance analysed would appear to have been a mixture of these two salts in about equal proportions.

The portions of the original resin (A) which had been dissolved by extraction with ether, chloroform, ethyl acetate, and alcohol respectively, were all very dark-coloured substances, from which nothing crystalline could be separated, and they were, therefore discarded. The ethyl acetate extract appeared to consist chiefly of the substance described under (B).

B) *Examination of the Precipitate produced by the addition of Sulphuric Acid to the Aqueous Filtrate from* (A).

This product, which is a crude and complex mixture of substances, would appear to represent the "gymnemic acid" described by Hooper (*loc. cit.*), although as obtained by us it differs considerably in some of its characters from those recorded by the former investigator. It amounted to about 17 per cent. of the weight of the leaves. For the purpose of its purification it was dissolved in alcohol, the solution mixed with sawdust which had previously been deprived of soluble substances, and, after thorough drying, extracted successively in a Soxhlet apparatus with the following solvents :—

1. Petroleum (b.p. 40–60°C.). This removed a very small amount of a yellowish fatty matter.

2. Ether. This extracted a small amount of a black resin.

3. Chloroform. This also extracted a relatively small amount of a soft black resin, containing much chlorophyll.

4. Ethyl acetate. This extracted an amount of substance corresponding to about 35 per cent. of the original precipitate or 6 per cent. of the weight of air-dried leaves.

5. Alcohol. This finally dissolved all of the residual substance.

Of the above extracts, only that obtained with ethyl acetate was capable of affecting or temporarily destroying the sense of taste for sweet substances. We are, therefore, unable to confirm the observation of Hooper (*loc. cit.*) that the anti-saccharine principle is soluble in ether, benzene and chloroform.

(*a*) *Characters of the Substance obtained from Precipitate* (B) *by extraction with Ethyl Acetate.* (*Gymnemic Acid.*)

The name of gymnemic acid has hitherto been applied to the complex mixture of substances precipitated by sulphuric acid, but as it has been shown by the above-described method of purification that the only portion of the mixture which possesses the peculiar anti-saccharine property of the leaves is that extracted by ethyl acetate, it would appear desirable that the name should at least be restricted to this active portion. Notwithstanding the fact that even the latter substance does not appear to be a chemical entity, the name of gymnemic acid may conveniently be retained for it, and it will, therefore, be so designated in the following description of its chemical characters.

Gymnemic acid is a resinous substance, of a greenish-brown colour, and has feebly acidic properties. It is only sparingly soluble in ethyl acetate, and is, therefore, extracted very slowly by this solvent from the crude product containing it. It is readily soluble in alcohol and in acetone, but is insoluble in petroleum, ether, chloroform, benzene and water. When gradually heated it softens, and melts indefinitely between 150° and 175°C.

An attempt was made to further purify the substance, and, as it could not be obtained in anything approximating a crystalline state, to ascertain by other means whether it was homogeneous in composition. It was, therefore, first extracted with

chloroform, which removed a further small quantity of chlorophyll. A portion of the substance was then dissolved in alcohol, mixed with sawdust, thoroughly dried, and extracted in a Soxhlet apparatus with ethyl acetate in such a manner as to obtain five successive fractions. Of these, the first, third and fifth fractions, after drying at 100°C., were analysed.

First Fraction.—0·1041 gave 0·2207 CO_2 and 0·0736 H_2O.
Third Fraction.—0·1394 gave 0·2940 CO_2 and 0·0917 H_2O.
Fifth Fraction.—0·1085 gave 0·2287 CO_2 and 0·0684 H_2O.

These figures correspond to the following percentages, which are in fairly close agreement :—

—	I.	III.	V.
C. . .	57·8	57·9	57·4 per cent.
H. . .	7·8	7·3	7·8 per cent.

Twenty Gm. of the substance were dissolved in alcohol, and boiled repeatedly with animal charcoal until the colour of the liquid no longer became appreciably lighter. After filtering, and removing the solvent, a brown, varnish-like mass was obtained, which could be reduced to a very light brown powder, and amounted to 11 Gm. This, after drying at 100°C., was also analysed, with the following result :—

0·1090 gave 0·2428 CO_2 and 0·0796 H_2O.
C=60·7 ; H=8·1 per cent.

This purified substance melted at 145–155°C., with decomposition, and, although rendered much lighter in colour by the above treatment, it possessed the same general characters as before. The result obtained by its analysis, however, afforded evidence that it had become appreciably changed in composition, and that it could not be regarded as an individual substance.

Gymnemic acid is readily dissolved by the caustic alkalis, forming dark coloured solutions, the sodium and potassium compounds being only sparingly soluble in the cold. The ammonium compound is a black, amorphous solid, which dissolves readily in water, forming a solution which froths strongly on agitation, and still possesses the anti-saccharine property. From the solutions of these compounds the gymnemic acid is

precipitated by mineral acids and by acetic acid, but it is readily re-dissolved by an excess of the latter. The potassium compound was boiled for a few minutes with a 20 per cent. aqueous solution of potassium hydroxide, and the gymnemic acid then re-precipitated, when it was found to have lost its anti-saccharine property. The acid dissolves slightly in cold sodium carbonate, no carbon dioxide being evolved until the liquid is boiled, when the acid dissolves freely. When the solution in sodium carbonate was boiled with animal charcoal, and the filtered liquid subsequently acidified, no precipitate was obtained, the gymnemic acid having been completely absorbed. The compounds of gymnemic acid with mercury, lead, silver, copper, iron, barium and calcium were prepared by the precipitation of a salt of the respective metal with a solution of the ammonium compound of the acid. When dry, they all formed black, amorphous products, soluble in alcohol, but which were quite unsuitable for analysis.

On warming gymnemic acid with concentrated nitric acid, a yellow, resinous compound was obtained, which was readily soluble in hot alcohol, and on cooling separated in an amorphous state.

If gymnemic acid is boiled for a few minutes with dilute sulphuric or hydrochloric acid, its anti-saccharine property is destroyed. The resinous substance which is formed shows practically the same behaviour towards solvents as the original acid, with the exception of being insoluble in alkalis. An alcoholic solution of hydrogen chloride had the same action as the aqueous acid. No sugar is produced by the above treatment, and we are, therefore, unable to confirm the observation of Hooper (*loc. cit.*), apparently made, however, with the crude substance, that gymnemic acid is a glucoside.

Action of Acetic Anhydride and of Benzoyl Chloride.—A portion of gymnemic acid was boiled with acetic anhydride and anhydrous sodium acetate, when it readily dissolved. On pouring this solution into water, a black, brittle, resinous solid separated. Another portion of the acid was dissolved in a solution of potassium hydroxide and shaken with benzoyl chloride, when a light brownish resin was obtained. These products were soluble in alcohol, ethyl acetate, and chloroform, but insoluble in alkalis, thus indicating that some change had been effected in the acid. Neither of them, however, could be obtained in a crystalline state.

Fusion with Potassium Hydroxide.—Forty Gm. of gymnemic

acid were introduced into 200 Gm. of the caustic alkali, to which a little water had been added, and the mixture gradually heated. At about 170°C. gas commenced to be evolved rapidly, and this continued until a temperature of about 220°C. was attained. A considerable portion of the acid did not pass into solution, but formed a spongy mass on the surface, which remained undissolved even when kept for some time at 250–270°C. After cooling, water was added, when the greater part of the fused mass was dissolved, but there remained an insoluble slimy product, which was separated by filtration, and, after treatment with dilute sulphuric acid, gave a resinous substance that was insoluble in all the ordinary solvents. The filtered liquid was acidified with sulphuric acid, distilled in steam, the volatile acid converted into a barium salt, and the concentrated solution of the latter precipitated in five fractions by silver nitrate. All of these fractions were analysed :—

Fraction 1.—0·2017 gave 0·1275 Ag. Ag=63·2 per cent.
Fraction 2.—0·2148 gave 0·1358 Ag. Ag=63·2 per cent.
Fraction 3.—0·1658 gave 0·1048 Ag. Ag=63·2 per cent.
Fraction 4.—0·2205 gave 0·1402 Ag. Ag=63·6 per cent.
Fraction 5.—0·2091 gave 0·1344 Ag. Ag=64·3 per cent.
$C_2H_3O_2$ Ag requires Ag=64·6 per cent.

The volatile acids formed by the fusion therefore consisted essentially of *acetic acid*, with apparently a very small amount of a higher acid.

The liquid remaining in the distillation flask was extracted with ether, the ethereal solution washed, dried, and the ether removed. A product was thus obtained which, when dissolved in hot water, treated with animal charcoal, and the solution concentrated, afforded colourless crystals. These melted at 192°C., and this melting point was not changed by further crystallisation. The substance gave the colour reactions characteristic of protocatechuic acid, and, after drying at 110°C., was analysed with the following result :—

0·1003 gave 0·2100 CO_2 and 0·0367 H_2O. C=57·1 ; H=4·1.
0·0961 gave 0·2008 CO_2 and 0·0366 H_2O. C=57·0 ; H=4·2.

The compound $C_7H_6O_4 + C_7H_6O_3$ requires C=57·5 ; H=4·1 per cent.

From the characters and analysis of this substance it is highly probable that it represents the compound formed by the union

of equal molecules of protocatechuic and para-oxybenzoic acids. This well-defined molecular compound of these two acids has previously been obtained by the fusion of benzoin with potassium hydroxide. Its components cannot be separated by crystallisation nor by fractional precipitation with lead acetate, since it is converted by the latter into a crystalline lead salt of constant composition. (Compare Beilstein's *Handbuch der Organischen Chemie*, Bd. II., p. 1740.)

Oxidation with Potassium Permanganate.—Forty Gm. of gymnemic acid and 10 Gm. of potassium hydroxide were dissolved in about 4 litres of water, and a cold, dilute solution of permanganate gradually added. The colour of the permanganate was rapidly discharged at first, but after 105 Gm. had been added it remained unchanged for some time. The liquid was filtered, the light yellow filtrate concentrated, and then acidified with sulphuric acid, when a very large amount of carbon dioxide was evolved, and a small quantity of resinous matter separated. On subsequent distillation in steam, an acid distillate was obtained from which a barium salt was prepared, and this afforded the reactions of *formic acid.*

The liquid remaining in the distillation flask was saturated with ammonium sulphate and repeatedly extracted with ether, but the latter removed only a small amount of brownish-coloured substance, from which nothing crystalline could be obtained.

(β) *Characters of the Acid Resin from Precipitate* (B), *which was insoluble in Ethyl Acetate.*

It has been noted that in the purification of the precipitate designated as (B) a considerable portion was insoluble in ethyl acetate, and was, therefore, finally extracted by alcohol, in which it was readily soluble. This substance was of a resinous nature, and when dry could be reduced to a light brown powder. It was freely soluble in alkalis, but completely devoid of the anti-saccharine property which particularly characterises the substance soluble in ethyl acetate.

It was thought of interest to ascertain whether there were any marked points of distinction in chemical behaviour between this acid resin and the gymnemic acid with which it was associated in the crude product. It was therefore dried at 100°C. and analysed.

0·0984 gave 0·2061 CO_2 and 0·0612 H_2O.

C=57·1 ; H=6·9 per cent.

It is thus seen not to differ very greatly in its elementary composition from the substance designated as gymnemic acid.

Fusion with Potassium Hydroxide.—Forty Gm. of the acid resin were fused with 200 Gm. of potassium hydroxide in the manner described under gymnemic acid, and the products of the reaction were similarly treated. The volatile acids were converted into a barium salt, and were found to consist chiefly of *formic acid*, with apparently a small amount of acetic acid. In this respect the acid resin differs essentially from gymnemic acid, since the latter yielded no formic acid by potash fusion.

After the separation of the volatile acids, the liquid remaining in the distillation flask was extracted with ether. A crystalline acid was thus obtained, which melted at 192°C., and gave the colour reactions characteristic of protocatechuic acid. It was dried at 110°C., and then analysed, with the following result :—

0·1040 gave 0·2181 CO_2 and 0·0390 H_2O. C=57·2 ; H=4·1.

The compound $C_7H_6O_4 + C_7H_6O_3$ requires C=57·5 ; H=4·1 per cent.

This substance evidently represents the molecular compound of protocatechuic and para-oxybenzoic acids, and is, therefore, identical with that obtained by the potash fusion of gymnemic acid.

(C) *Examination of the Aqueous Liquid remaining after the separation of the Precipitates* (A) *and* (B).

This liquid, as previously noted, was deprived of colouring matter, and concentrated under diminished pressure. It then formed a thick syrup, which slowly deposited a quantity of colourless crystals. This crystalline substance consisted of a *lævo-rotatory modification of quercitol*, a pentatomic alcohol of the formula $C_6H_7(OH)_5.H_2O$, which has already been fully described by the authors (*Journal of the Chemical Society*, 1904, **85**, 624). The syrupy liquid contained an abundance of sugar, from which an osazone was prepared. This crystallised in handsome, bright yellow needles, and melted at 218–219°C., which is the melting point of the osazone of *inactive glucose*. It was analysed with the following result :—

0·1056 gave 0·2339 CO_2 and 0·0590 H_2O. C=60·3 ; H=6·2.
$C_{18}H_{22}N_4O_4$ requires C=60·3 ; H=6·1 per cent.

On heating the above-mentioned syrupy liquid with potassium

hydroxide, an abundance of ammonia was evolved, which indicated that it also contained some proteid matter.

The Fruits of Gymnema sylvestre.

From the large quantity of gymnema leaves available to us, it was possible to separate a sufficient quantity of the fruits of the plant for a comparative examination. They were ground, and extracted by percolation with alcohol, which yielded an amount of dry extract corresponding to 7·7 per cent. of their weight. This extract was treated in a similar manner to that obtained from the leaves, and, although not quite so completely examined, it appeared to have the same general characters as the latter. No quercitol, however, could be obtained from it, and most of the products were dark in colour, amorphous, and of a resinous nature.

Summary and Conclusions.

From the somewhat extended details of this investigation the essential results and deductions therefrom may be briefly summarised.

1. The leaves of *Gymnema sylvestre* contain no cyanogenetic compound, such as has been observed by Greshoff to exist in the leaves of *G. latifolium* (*Ber. d. deutsch. chem. Ges.*, 1890, **23,** 3548).

2. From an alcoholic extract of the leaves, water precipitates a quantity of soft, dark-coloured, resinous matter, of an acid nature, the chief portion of which is soluble in petroleum. This petroleum extract, after treatment with an alcoholic solution of potassium hydroxide, yielded to ether a substance crystallising in pearly leaflets, melting at 68°C., which was identified as *hentriacontane*, $C_{31}H_{64}$. It is contained to the extent of about 0·05 per cent. in the leaves. The alkaline liquid, when acidified and distilled, yielded *formic acid* and a *butyric acid*.

3. The filtrate from the above precipitate, when acidified with sulphuric acid, yielded a quantity of a dark coloured resinous product. This would appear to represent the substance described several years ago by Hooper (*Chemical News*, 1899, **59,** 159), who observed it to possess the peculiar, anti-saccharine property of the leaves, and designated it as "gymnemic acid." He regarded it as a glucoside, existing in the leaves as a potassium salt, and assigned to it the formula $C_{32}H_{55}O_{12}$, although neither the substance itself nor any derivative of it

was obtained in a crystalline state. The results of our investigation have shown that the precipitate obtained by the above described method is an exceedingly impure and complex mixture of substances. By its successive treatment with various solvents, a portion was extracted by ethyl acetate, which alone possessed the property of destroying the sense of taste for sweet substances, and which amounted to about 35 per cent. of the original precipitate, or about 6 per cent. of the weight of air-dried leaves employed. For the portion thus dissolved by ethyl acetate the name of *gymnemic acid* may conveniently be retained as a distinguishing title, although, even in the purest form in which we have been able to obtain it, there is no assurance that it represents a homogeneous substance. It is amorphous, and apparently incapable of yielding any crystalline salt or other simple crystalline derivative. For these reasons it is undesirable that any chemical formula should be assigned to it. It is sparingly soluble in ethyl acetate, readily soluble in alcohol, and insoluble in ether, chloroform, benzene, and water. It is not a glucoside, but has very weak acidic properties, so that it is readily separated from a solution of the soluble combination in which it exists in the leaves by the addition of a mineral acid. Its anti-saccharine properties are destroyed by heating with the fixed alkalis or with dilute mineral acids. When fused with potassium hydroxide it afforded *acetic acid* and a molecular compound of *protocatechuic and para-oxybenzoic acids*, melting at 192°C. On oxidation with potassium permanganate the only product that could be identified was *formic acid*.

It has been stated by Hooper (*loc. cit.*) that "as gymnemic acid forms insoluble salts with alkaloids, this accounts for its masking the taste of quinine and other bitter substances." It is evident, however, from the physiological tests that have been made with the acid, that its property of affecting the sense of taste is due to its action upon the nerve fibres or nerve endings of the tongue, although this is less marked in the case of bitter than of sweet substances.

4. The resinous substance associated with the gymnemic acid in the crude product as first precipitated, but which is insoluble in ethyl acetate, is readily dissolved by alcohol. It is also of an acidic nature, but is completely devoid of any anti-saccharine property. When fused with potassium hydroxide it yielded *formic acid* and apparently a small amount of acetic acid, together with the same crystalline compound of *proto-*

catechuic and para-oxybenzoic acids, as was obtained from gymnemic acid by this treatment.

5. The aqueous liquid from which the preceding substances had been separated, after being deprived of colouring matter, afforded a handsomely crystalline substance. This consisted of a *lævo-rotatory modification of quercitol*, which has already been described by the authors (*Journ. Chem. Soc.*, 1904, **85**, 624). It was associated with a sugar, the crystalline osazone of which melted at 218 to 219°C., and, therefore, corresponds with that of *inactive glucose*.

6. The constituents of the fruits of *Gymnema sylvestre* appear to be similar to those of the leaves, but no quercitol could be obtained from them.

7. Some experiments conducted in the Wellcome Physiological Research Laboratories have shown that neither the gymnemic acid nor the resin insoluble in ethyl acetate possesses toxic properties, nor could any pronounced physiological effects be observed when these substances were administered to the lower animals in doses of 0·5 to 1 Gm.

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THE CHEMICAL AND PHYSIOLOGICAL ASSAY OF DIGITALIS TINCTURES.

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AND
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In many cases the active principle of a pharmaceutical preparation being well known and well characterised, chemical assay methods have been worked out which give perfectly reliable results. In others, such as that of diphtheria antitoxin, no such method being possible at present, we must rely entirely upon physiological methods. Between these extremes there are a number of cases in which physiological and chemical methods contend for superiority, and among these is that of Digitalis.

A chemical method for the quantitative estimation of the physiologically active glucosides in this plant has been proposed by Keller (*Ber. d. deutsch. pharm. Ges.*, 1897, **7**, 125). Of these glucosides, digitoxin is the chief contributor to the activity of the drug. This led Ziegenbein (*Archiv der Pharmacie*, 1902, 240, 454) to compare the physiological activity of a number of

samples of Digitalis leaves with the amount of digitoxin found in them by Keller's method. He finds that there is no relation between these two quantities, and concludes that the chemical assay method is unsatisfactory, but that the frog's heart satisfies all the demands which can reasonably be made.

In the course of an examination of a series of tinctures which had been obtained from various commercial sources, and had been prepared according to the directions of the British Pharmacopœia, third edition, we were led to a comparative study of the two methods, chemical and physiological. The chemical part was limited to the determination of the digitoxin contained in the various tinctures. The determination of digitalin and digitaleïn was not attempted, though Keller has given directions for accomplishing it. Both of the latter two principles are soluble in water, and it seemed doubtful whether they could be sharply separated from one another. The digitoxin is insoluble in water, but soluble in chloroform, and hence can be estimated with greater certainty. Moreover, as will be seen from our experiments, the digitoxin is the chief active constituent of Digitalis tincture.

For the estimation of digitoxin Keller's method was employed with the following slight modifications: Keller works with 20 Gm. of leaves, or with 200 Gm. of tincture. According to the Swiss Pharmacopœia, these quantities are equivalent, for 1 part by weight of leaves is extracted with 10 parts by weight of alcohol. The British Pharmacopœia directs that 125 Gm. of leaves should be percolated with 1000 c.c. of 60 per cent. alcohol. The density of this alcohol is 0·913, hence 1 Gm. of leaves is percolated with $\frac{0{\cdot}913 \times 1000}{125} = 7{\cdot}3$ Gm. of alcohol. In order to have quantities equivalent to Keller's 20 Gm. of leaves, we at first used 146 Gm. of tincture for an estimation; later we used 73 Gm., since the accuracy of the chemical estimations even then exceeded that of the physiological ones. The 146 Gm. of tincture were evaporated on a water-bath to 25 c.c. or less to remove the alcohol, and made up with water to 222 Gm. Here the first difficulty presents itself, for by the evaporation of the alcohol a resin separates out, which is mostly insoluble in water, and any digitoxin which may be contained in it will escape estimation. The water is best added in small quantities, and the dish containing the resin warmed on the water-bath while its contents are stirred vigorously, so as to have it suspended in as fine a condition as possible.

To the 222 Gm. of the turbid solution 25 Gm. of a saturated solution of basic lead acetate were added, and the precipitate was filtered off through an ordinary folded filter. In most cases the precipitation was complete, but in the case of two tinctures which contained an abnormally high amount of solids (4·7 and 4·9 per cent.) much more lead acetate was required, and so we did not use 146 Gm. of tincture, but two-thirds of that amount, keeping the other quantities the same. According to Keller, the total solids in carefully prepared Digitalis tincture (Swiss Pharmacopœia) ought to be 3·5 to 3·7 per cent., though it generally falls below 3 per cent. Allowing for the difference in strength, good British tincture ought probably to contain $\frac{10}{7 \cdot 3}$ times as much, or 4·8 to 5·0 per cent.

Out of the nine tinctures examined, only two came up to this value, the average being 3·4 per cent.

The lead acetate produces in the turbid solution a voluminous yellow precipitate, which is filtered off through an ordinary folded filter. According to Keller, this precipitate from 20 Gm. of leaves weighs 7 Gm. We found for four different tinctures, after washing the precipitate very thoroughly and drying at 110°, 4·4, 5·4, 5·6, and 7·7 Gm. These tinctures contained respectively 2·7, 3·6, 3·7, and 4·9 per cent. of total solids. The average weight of our lead precipitates was therefore less than 6 Gm., but for the sake of simplicity we adhere to Keller's amount.

If to 222 Gm. of the turbid solution 25 Gm. of lead acetate be added, it makes a total of 247 Gm., and if the precipitate weighs 7 Gm., the solution—240 Gm.—is equivalent to 20 Gm. of leaves. Of these 240 Gm. of solution, 132 Gm. can readily be obtained by filtration, representing 11 Gm. of leaves. Keller now removes the excess of lead by adding 5 Gm. of sodium sulphate in 7 Gm. of water, filters, and takes 130 Gm. of the filtrate, corresponding to 10 Gm. of leaves. Clearly, there is a slight error, as the amount of the reagent added should be 11 Gm. (instead of $5+7=12$) to bring the 132 Gm. up to 143 Gm., 13 Gm. of solution being equivalent to 1 Gm. of leaves. Keller allowed the lead sulphate to settle down in an inclined flask, and then poured off the required 130 Gm. of liquid. We found some difficulty in completely precipitating the lead in this manner, and as lead sulphate is less soluble in dilute sulphuric acid than in water, we added 5 Gm. of sodium sulphate + 6 Gm. of 10 per cent. sulphuric acid. The decantation process

proved troublesome, but the lead sulphate is easily and rapidly filtered off through a Schleicher and Schüll folded filter paper No. 584 (18½ Cm. diameter). Of the filtrate, 130 Gm. were made alkaline with 2 c.c. of 10 per cent. ammonia; the solution remained perfectly clear, and was shaken out four times with 30 c.c. of chloroform. The chloroform extract was filtered, evaporated to a small bulk, and then washed into a small wide weighing bottle with ground stopper, in which it was evaporated to dryness, first on the water-bath, then in the steam oven, till of constant weight. The residue is "crude digitoxin." Keller purifies this by dissolving it again in chloroform, adding ether and petroleum ether, and collecting the precipitate formed on a small filter, from which it is dissolved again by hot absolute alcohol, after it has been washed with petroleum ether. Here again we departed slightly from Keller's method, as we found it troublesome to remove the precipitate (which only weighs a few milligrammes) quantitatively from the filter. We, therefore, placed the chloroform solution in a tall 50 c.c. or 100 c.c. stoppered measuring cylinder, in which the digitoxin was precipitated and allowed to settle overnight. The following day the clear liquid, containing impurities, was decanted, and the digitoxin washed by shaking it with a further quantity of petroleum ether. This was decanted, and finally the digitoxin, mixed with some petroleum ether, was dissolved in hot absolute alcohol. The solution was washed into a weighing bottle and evaporated; dry ether was added and evaporated off, and then the substance, which we will call "pure digitoxin Keller," was weighed. We must observe in this connexion that we have never seen the least trace of crystalline structure in this residue, as Keller claims to have found. As will be shown below, only two-thirds of Keller's "pure digitoxin" is really digitoxin. In the physiological estimation of the activity of the tinctures, and of the digitoxin obtained from them, frogs were used. The species was *Rana temporaria*: the weights were generally between 20 Gm. and 35 Gm., but comparative experiments were limited to frogs of nearly the same weight. Males were used almost exclusively, and the time of year was early summer.

The tinctures were tested by evaporating a known weight on the water-bath, and suspending the residue in a definite volume of hot water. The digitoxin "Keller" or digitoxin "Merck" was dissolved in the least possible quantity of absolute alcohol, and this was diluted with distilled water. The finely divided

substance was injected before it could settle down, and always contained less than 10 per cent. of alcohol. The quantity injected, namely, 1 c.c. of 10 per cent. alcohol, was shown to be practically innocuous. Moreover, digitoxin kills by stopping the heart in systole, whereas with alcohol the heart continues beating long after reflexes are lost. The injections were made into the dorsal lymph sac, and for decisive experiments the volume of liquid was invariably 1 c.c. The animals were kept under observation in a moist atmosphere, and the time was noted when the heart stopped. It was found that if death did not occur within about 3 hours, the animal survived.

The following table shows the density and percentage of total solids of the nine tinctures :—

Tincture.	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
Density . .	0·927	0·934	0·928	0·933	0·932	0·930	0·930	0·936	0·926
Per cent. solids	2·6	4·7	4·1	3·2	3·7	2·7	3·1	4·9	3·6

The percentages of digitoxin found by Keller's method (slightly modified) are given below. Of the first three tinctures we made a larger number of estimations in order to see to what extent concordant results could be obtained.

	Percentage of "Crude" Digitoxin.	Percentage of "Pure" Digitoxin.	Ratio of "Pure" to "Crude."
I. *a* . . .	0·081	0·032	0·40
b . . .	0·051	0·036	0·71
c . . .	0·076	0·034	0·73
d . . .	0·050	0·030	0·60
e . . .	0·043	0·030	0·69
f . . .	0·045	0·034	0·75
Mean . .	0·053	0·033	0·65
II. *a* . . .	0·058	0·042	0·73
b . . .	0·054	0·039	0·69
c . . .	0·053	0·033	0·62
d . . .	0·049	0·036	0·73
e . . .	0·060	0·039	0·66
f . . .	0·056	0·041	0·74
Mean . .	0·055	0·038	0·69
III. *a* . . .	0·038	—	—
b . . .	0·048	—	—
c . . .	0·054	—	—
d . . .	0·036	—	—
e . . .	0·040	—	—
f . . .	0·046	0·028	0·63
Mean . .	0·044		

—	Percentage of "Crude" Digitoxin.	Percentage of "Pure" Digitoxin.	Ratio of "Pure" to "Crude."
IV. *a*	—	0·026	—
b	0·034	0·022	0·64
V. *a*	—	0·020	—
b	0·040	0·023	0·58
VI. *a*	0·051	0·033	0·65
b	0·053	0·040	0·75
VII. *a*	—	0·029	—
b	0·045	0·027	0·60
VIII. *a*	—	0·039	—
b	0·060	0·038	0·63
IX. *a*	—	0·034	—
b	0·054	0·032	0·59
Mean for all tinctures	0·0485	0·031	0·64

It will be seen that in the values for pure digitoxin the maximum deviation from the mean is about 10 per cent. Many of the estimations were done on 73 Gm. of tincture, and some on two-thirds of this amount. The weight of the pure digitoxin is generally about two-thirds of the weight of the crude substance.

In the physiological part of the work the toxicity of all the tinctures was first determined. In the following tables M.L.D. signifies minimal lethal dose. The determinations of the M.L.D. for the first three tinctures are given in full, by way of illustration. In all the other cases only the results of the injection of doses immediately above and below the M.L.D. have been recorded.

TINCTURE DIGITALIS I.

Dose.	Weight of Frog in Gm.	Result.
0·5 c.c.	25	died, 120 minutes.
0·5 c.c.	24	died, 80 minutes.
0·4 c.c.	23	died, 100 minutes.
0·4 c.c	22	died, 80 minutes.
0·4 c.c.	22	died, 80 minutes.
0·3 c.c.	22	lived.
0·25 c.c.	22	lived.
0·25 c.c.	21	lived.

Hence M.L.D. = 0·4 c.c. Tincture I (for 22 Gm. frog).

Tincture Digitalis II.

Dose.	Weight of Frog in Gm.	Result.
0·5 c.c.	34	lived.
0·5 c.c.	31	died, 45 minutes.
0·5 c.c.	36	died, 100 minutes.
0·5 c.c.	20	died, 40 minutes.
0·4 c.c.	31	died, 50 minutes.
0·4 c.c.	32	died, 120 minutes.
0·4 c.c.	35	died, 90 minutes.
0·35 c.c.	32	died, 40 minutes.
0·35 c.c.	32	died, 45 minutes.
0·35 c.c.	30	lived.
0·35 c.c.	35	lived.
0·31 c.c.	31	lived.
0·31 c.c.	30	lived.
0·31 c.c.	34	lived.
0·31 c.c.	36	lived.
0·31 c.c.	31	lived.

Hence M.L.D. = 0·35 c.c. Tincture II (for 32 Gm. frog).

Tincture Digitalis III.

Dose.	Weight of Frog in Gm.	Result.
1·0 c.c.	24	died, 55 minutes.
1·0 c.c.	23	died, 80 minutes.
0·8 c.c.	26	died, 80 minutes.
0·6 c.c.	25	died, 85 minutes.
0·5 c.c.	27	died, 120 minutes.
0·5 c.c.	24	died, 110 minutes.
0·4 c.c.	22	died, 100 minutes.
0·4 c.c.	21	died, 90 minutes.
0·4 c.c.	23	lived.
0·3 c.c.	24	lived.
0·3 c.c.	24	lived.

Hence M.L.D. = 0·45 c.c. Tincture III (for 23 Gm. frog).

Tincture.	Dose.	Weight of Frog in Gm.	Result.
IV.	0·4 c.c.	24	died, 110 minutes.
		25	died, 100 minutes.
	0·3 c.c.	23	died, 180 minutes.
		22	lived.
	0·2 c.c.	22	lived.
		22	lived.
	M.L.D. = 0·35 c.c. for 23 Gm. frog.		
V.	0·4 c.c.	36	died, 120 minutes.
		32	died, 100 minutes.
		29	died, 100 minutes.
		29	died, 100 minutes.
	0·3 c.c.	26	died, 120 minutes.
		26	died, 150 minutes.
		28	lived.
		30	lived.
	0·25 c.c.	29	lived.
		29	lived.
	M.L.D. = 0·35 c.c. for 27 Gm. frog.		
VI.	0·4 c.c.	25	died, 130 minutes.
		24	died, 120 minutes.
	0·3 c.c.	25	lived.
		23	lived.
	M.L.D. = 0·4 c.c. for 24 Gm. frog.		
VII.	0·6 c.c.	33	died, 140 minutes.
		32	died, 120 minutes.
	0·5 c.c.	25	died, 120 minutes.
		26	died, 140 minutes.
		32	lived.
		34	lived.
	M.L.D. = 0·5 c.c. for 29 Gm. frog.		
VIII.	0·25 c.c.	21	died, 120 minutes.
		20	died, 90 minutes.
		20	died, 120 minutes.
		24	lived.
	M.L.D. = 0·25 c.c. for 22 Gm. frog.		
IX.	0·4 c.c.	25	died, 100 minutes.
		23	died, 100 minutes.
	0·3 c.c.	20	died, 120 minutes.
		23	lived.
		20	lived.
	M.L.D. = 0·33 c.c. for 22 Gm. frog.		

The preceding tables are summarized below.

The M.L.D. for 100 Gm. of frogs has been calculated on the supposition (not verified) that the dose for frogs is proportional to their weight.

	Average Weight of Frogs Receiving M.L.D.	Dose Given in Preceding Tables.	Calculated M.L.D. for 100 Gm. of Frog.
I.	22 Gm.	0·40 c.c.	1·7 Gm.
II.	32 Gm.	0·35 c.c.	1·0 Gm.
III.	23 Gm.	0·45 c.c.	1·8 Gm.
IV.	23 Gm.	0·35 c.c.	1·4 Gm.
V.	27 Gm.	0·35 c.c.	1·2 Gm.
VI.	24 Gm.	0·40 c.c.	1·6 Gm.
VII.	29 Gm.	0·50 c.c.	1·6 Gm.
VIII.	22 Gm.	0·25 c.c.	1·0 Gm.
IX.	22 Gm.	0·33 c.c.	1·4 Gm.

Approximately the toxicity of the strongest tinctures examined is about one and a half times that of the weakest. The toxicity of a number of samples of " pure digitoxin " obtained by Keller's method were next determined. The results are given in the following table :—

Tincture.	Digitoxin Estimation.	M.L.D.
I.	(*e*)	0·51 Milligrams
II.	(*a*)	0·47 Milligrams
II.	(*b*)	0·47 Milligrams
II.	(*c*)	0·40 Milligrams
IV.	(*b*)	0·41 Milligrams
V.	(*b*)	0·425 Milligrams
VI.	(*b*)	0·60 Milligrams

Mean = 0·475 Milligrammes of purified digitoxin.

The M.L.D. for Merck's crystallized *Digitoxin* and for Nativelle's *Digitaline crystallisée* were next determined. Whether or not these two substances are identical remains at present doubtful ; Kiliani (*Archiv der Pharmacie*, 1897, **235,** 425) inclines to the view that the French digitaline is the same as his " digitophyllin." It was found that both products have the same M.L.D., viz., 0·3 Mgm. This was established by the following experiments :—

DIGITOXIN " MERCK."

Dose in Milligrammes.	Weight of Frog in Gm.	Result.
0·3	23	died, 90 minutes.
0·3	24	died, 100 minutes.
0·25	25	lived.
0·2	22	lived.
0·2	25	lived.

M.L.D. = 0·3 Milligrammes. The heart stops in systole.

NATIVELLE'S DIGITALINE CRYSTALLISÉE.

0·35	32	died, 120 minutes.
0·35	29	died, 75 minutes.
0·35	27	died, 75 minutes.
0·30	35	lived.
0·30	30	died, 75 minutes.
0·30	26	died, 180 minutes.
0·30	25	lived.
0·30	22	lived.
0·25	31	lived.
0·25	22	died, 85 minutes.

M.L.D. = 0·3 Milligrammes. The heart stops in systole.

It will be seen that Merck's crystallized digitoxin (prepared according to Kiliani's method) is about one and a half times as active as Keller's purified digitoxin. Cloetta came to the same conclusion (*Chem. Centralblatt*, 1904, **1**, 1459). That Keller's purified digitoxin still contains 33 per cent. of impurities need cause no surprise, considering the roughness of his method of purification. We said above, page 546, that Keller's crude digitoxin generally weighs one and a half times as much as his purified product. This result we confirmed by physiological means; the toxicity of the crude digitoxin is two-thirds of that of the purified, as shown by the following table :—

CRUDE DIGITOXIN, OBTAINED BY KELLER'S METHOD.

Tincture.	Digitoxin Estimation.	M.L.D. in Milligrammes.
III.	(*b*)	0·70
III.	(*c*)	0·70
III.	(*e*)	0·74
		Mean = 0·71

Ratio of M.L.D. "crude" and "pure" = 0·71 : 0·475 = 1·5.

For the sake of completeness the M.L.D. of Merck's digitalin, Gehe's digitalin, and Merck's digitaleïn were also determined. The results were as follow for 25 Gm. frogs :—

Digitalin "Merck"	1·25 milligrammes.
Digitalin "Gehe"	2 milligrammes.
Digitaleïn "Merck"	1·5 milligrammes.

With all these water-soluble preparations the heart stopped in diastole.

It will be seen that digitalin and digitaleïn are much less toxic than digitoxin. Hence it has been supposed that the amount of digitoxin present in a tincture gives an indication of

its toxicity. That this is not so—at least, if we take the digitoxin values as obtained by Keller's method—is seen by the following compilation, calculated from previous tables :—

Tincture.	Weight of Frog in Grammes Killed by 1 Gramme of Tincture.	Percentage of Digitoxin in Tincture.	Weight of Frog in Grammes Killed by Digitoxin in 1 Gramme of Tincture.	Ratio of Toxicity of Tincture to Toxicity of Digitoxin in it
I.	59	0·032	17	3·5
II.	100	0·038	20	5·0
III.	55	0·028	15	3·7
IV.	71	0·024	13	5·5
V.	83	0·022	12	6·9
VI.	77	0·036	19	4·1
VII.	62	0·028	15	4·1
VIII.	100	0·038	20	5·0
IX.	71	0·033	17	4·2

The figures of the last column are very similar to those found for the same ratio by Ziegenbein (*loc. cit.*, p. 470) : he gives for six tinctures 5, 3·3, 6·6, 4, 2·6, and 4. As the digitoxin obtained in Keller's method only represents on the average one quarter of the total toxicity of the tincture, the toxicity of the aqueous solution containing digitalin and digitaleïn which remains after shaking out the digitoxin with chloroform was determined. This solution was concentrated on the water-bath, and at the same time the chloroform and ammonia contained in it were expelled. The results for six tinctures are given below : –

Number of Digitoxin Estimation.	Weight of Frogs Used in Grammes.	M.L.D. for One Frog in Gramme of Tincture.	M.L.D. for 100 Grammes of Frog in Gramme of Tincture.
I. (*d*)	25	1·75	7·0
I. (*e*)	30	1·8	6·0
I. (*f*)	30	2·25	7·5
II. (*b*)	25	0·8	3·2
III. (*d*)	25	1·65	6·6
V. (*b*)	25	1·5	6·0
VIII. (*b*)	25	1·0	4·0
IX. (*b*)	25	1·8	7·2

From the above results we have calculated the weights of frog killed by the water-soluble substances in 1 Gm. of the tinctures. They are tabulated below, together with the weights of frog killed by 1 Gm. of the tinctures, and also by the digitoxin in 1 Gm. of the tinctures (as already given) :—

Number of Tincture.	Weight of Frog in Grammes Killed by 1 Gramme of Tincture.	Weight of Frog in Grammes Killed by Digitoxin in 1 Gramme of Tincture.	Weight of Frog in Grammes Killed by Water-soluble substances in 1 Gramme of Tincture.	Total Toxicity Accounted for (Gramme of Frog).	Percentage of Toxicity of Tincture Accounted for.
I. .	59	17	15	32	54 per cent.
II. .	100	20	30	50	50 per cent.
III. .	55	15	16	31	56 per cent.
V. .	83	12	17	29	35 per cent.
VIII. .	100	20	26	46	46 per cent.
IX. .	71	17	18	35	49 per cent.

As about half of the toxicity of the original tincture is unaccounted for, Keller's method would appear to be of little value. This conclusion is furthermore supported by the following experiment. To 94·7 Gm. of tincture No. II., which we had previously found to contain 0·038 per cent. of digitoxin "Keller," we added 0·0308 Gm. of digitoxin "Merck," equivalent to 0·032 per cent., dissolved in a few cubic centimetres of 60 per cent. alcohol. We then divided the mixture into halves, and estimated the digitoxin in each of these, finding :—

In the first half 0·050 per cent. of digitoxin.
In the second half 0·043 per cent. of digitoxin.

Subtracting in each case the 0·038 per cent. already known to be present, we find that of the 0·032 per cent. added, 0·012 per cent. was recovered in one case and 0·005 per cent. in the other, a very insignificant portion of the amount added.

We also made a similar experiment with amorphous digitalin, 30 Milligrammes of which were added to 97·4 Gm. of tincture II. We found the *crude* digitoxin to be : in the first half 0·053 per cent., in the second half 0·063 per cent., mean 0·058 per cent., which is practically identical with the mean for the tincture itself, i.e., 0·055 per cent. On the other hand, the water-soluble constituents of 1 Gm. of this artificially strengthened tincture now killed 34 Gm. of frog, as against 30 Gm. for the tincture itself. This increase corresponds to 20 Mgm. of digitalin instead of the 30 Mgm. actually added. That more was not found is due to the limitations of the physiological methods.

Our next step was to prepare a plant tincture similar to that of Digitalis, but free from toxic principles. For this purpose we percolated a mixture of chaff and finely cut hay with 60 per

cent. alcohol, and got a tincture the specific gravity of which was 0·932, and which left on evaporation 2·9 per cent. of solids, comparable therefore to the Digitalis tinctures investigated. The M.L.D. of this was determined by evaporating a known weight of the tincture, and making it up to a known volume with water, in the usual way. Three frogs lived, two frogs died with a dose corresponding to 13 Gm. of this tincture. It was therefore practically innocuous. We then added 0·04 per cent. of crystallised digitoxin, dissolved in a little alcohol, and tested this artificial tincture physiologically, with the following results :—

Dose.	Weight of Frog in Gm.	Result.
1·0 Gm. . . .	23	died, 100 minutes.
1·0 Gm. . . .	19	died, 90 minutes.
1·0 Gm. . . .	19	died, 90 minutes.
0·8 Gm. . . .	23	died, 120 minutes.
0·8 Gm. . . .	23	died, 120 minutes.
0·8 Gm. . . .	21	died, 100 minutes.
0·7 Gm. . . .	29	lived.
0·7 Gm. . . .	26	lived.
0·6 Gm. . . .	25	lived.

M.L.D. =0·8 Gm. of Tincture = 800 Milligrammes.

For the digitoxin added we had previously found M.L.D. = 0·3 Milligrammes, so that the physiological tests showed the presence of $\frac{0{\cdot}3 \times 100}{800} = {\cdot}0375$ per cent. digitoxin, whereas we had put in 0·4 per cent.

The digitoxin in this artificial tincture was next estimated by Keller's method, but we only found a mere trace (0·01 per cent.). This disappearance of the digitoxin is to be attributed to its being insoluble in water, and adhering to the resin which separates out when alcohol is evaporated off from the tincture. This resin is stirred up with water, but never properly enters into solution, and when the precipitate caused by lead acetate is filtered off, this resin with the digitoxin remains behind on the filter. We therefore evaporated the tincture, added water as usual, and then filtered off the resin. Resin and filtrate were both tested physiologically. For this purpose the resin was dissolved in dilute alcohol, the alcohol evaporated off, and the residue suspended in water. The results were as follow :—

Filtrate.

Solution concentrated to $\frac{1}{8{\cdot}3}$ of its original volume.

Dose in Grammes of Original Tincture.	Weight of Frogs in Grammes.	Result.
6·6	31	died, 120 minutes.
6·6	25	died, 100 minutes.
5·0	30	lived.
5·0	29	lived.

M.L.D. = 6·6 Gm. for 25 Gm. frog. 1 Gm. of filtrate kills 0·15 frog = 4 Gm. frog.

Resin.

Suspended in a quantity of water equal to $\frac{1}{2{\cdot}4}$ of the volume of tincture.

Dose in Grammes of Original Tincture.	Weight of Frog in Grammes	Result.
0·88	22	died, 120 minutes.
0·88	20	died, 100 minutes.
0·88	24	died, 140 minutes.
0·66	24	lived.
0·66	24	lived.

M.L.D. = 0·88 Gm. for a 22 Gm. frog. 1 Gm. kills 1·14 frog = 25 Gm. frog.

Adding together the toxicity of resin and filtrate, we get for the tincture :—

1 Gm. kills $0{\cdot}15 + 1{\cdot}14 = 1{\cdot}29$ frog or $4 + 25 = 29$ Gm. of frog.

The M.L.D. for this artificial tincture had previously been found to be 0·8 Gm. for 22 Gm. frog, i.e., 1 Gm. kills 1·25 frog = 29·5 Gm. of frog.

As will be seen, we have proved (with an appearance of greater accuracy than is obtainable by our methods) that the toxicities of the parts are together equal to the toxicity of the whole. Of these two parts the resinous portion is by far the more active : it contains nearly all the digitoxin added to the chaff tincture, and hence this digitoxin escapes estimation by Keller's method. This result explains why Keller's method gave us a digitoxin

value for our artifical tincture which was much too low ; for the same reason too small values are obtained for the digitoxin in ordinary Digitalis tinctures. In order to confirm this result we evaporated down a quantity of No. 1 tincture (previously referred to), added water, filtered off the resin, and tested resin and filtrate as in the case of the chaff tincture.

Filtrate.

Seventy-three Gm. tincture = 10 c.c.

Dose of Tincture.	Weight of Frogs in Grammes.	Result.
0·73 Gm. . .	19	died, 120 minutes.
0·73 Gm. . .	15	died, 100 minutes.
0·73 Gm. . .	16	lived.
0·55 Gm. . .	18	lived.
0·55 Gm. . .	15	lived.

M.L.D. = 0·73 Gm. for 19 Gm. frog. Filtrate from 1 Gm. tincture kills 1·37 frog = 26 Gm.

Resin.

From 73 Gm. of tincture, made up to 20 c.c.

Dose of Tincture.	Weight of Frog in Grammes.	Result.
0·73 Gm. . .	21	died, 120 minutes.
0·73 Gm. . .	20	died, 100 minutes.
0·73 Gm. . .	18	died, 90 minutes.
0·55 Gm. . .	18	lived.
0·55 Gm. . .	15	died, 100 minutes.
0·55 Gm. . .	15	died, 100 minutes.
0·55 Gm. . .	23	lived.

M.L.D. = 0·73 Gm. for 18 Gm. frog. Resin from 1 Gm. tincture kills 1·37 Gm. frog = 25 Gm. frog.

Previously it had been found that 0·4 c.c. of tincture I killed a 22 Gm. frog (page 546), i.e., 1 Gm. kills 2·7 frog = 59 Gm. of frog.

Total for resin + filtrate = 2·74 frogs = 51 Gm. of frog.

Previously, by working with Keller's method, it had been found that :—

Toxicity of digitoxin + toxicity of water-soluble part = 32 Gm. of frog.

It will be seen that, as with the chaff tincture, most of the digitoxin remains on the filter together with the lead precipitate. As the resin in the case of digitalis tincture separates out with greater difficulty than in the case of the chaff tincture, the amount of digitoxin which passes through the filter is slightly larger, about one-third of the total amount. (Toxicity of 1 Gm. of tincture I = 59 Gm. of frog; water-soluble portion = 15 Gm. of frog, hence total digitoxin = 44 Gm. of frog. Of this an amount corresponding to 15 Gm. of frog was found, therefore approximating to one-third of the total amount present. See table, page 552).

Summary.

Our conclusions may be briefly summarized as follow :—

1. The amount of digitoxin found by Keller's method in the B.P. tincture of Digitalis is less than half the amount actually present.

2. As yet the only reliable method for the assay of Digitalis tincture is the physiological one.

THE WELLCOME PHYSIOLOGICAL RESEARCH LABORATORIES, HERNE HILL, LONDON, S.E.

The three foregoing papers were taken as read in the absence of the authors.

Mr. Maben, referring to the paper on digitalis, said that there was one aspect of the case that the authors had not specifically referred to in their exceedingly interesting paper. It was well known that commercial samples of digitalin and digitoxin varied in physiological activity to a marked degree, the variation being sometimes as great as 1 is to 4, and not only so, different samples of digitalin from the same maker also varied. Then again, the digitalin of Nativelle was said to be digitoxin, and Homolle's preparation was also said to be digitoxin, or a mixture of glucosides. The fact was that the activity of these substances had no necessary relationship to their name, and the statement of the authors that "as yet the only reliable assay method of digitalis tincture is the physiological one" applies equally to the so-called active principles of the drug as found in commerce.

Mr. MacEwan said he had seen Dr. Power a few days before

he sailed for the United States, and he asked him to explain that nothing but the fact that this was a visit to his family would have prevented him being present to read his paper that day.

The thanks of the Conference were accorded to the authors of the papers mentioned, and the members then adjourned for luncheon.

THE CULTIVATION OF VALERIAN RHIZOME IN DERBYSHIRE.

By F. A. Upsher Smith,

Pharmaceutical Chemist.

The present visit of the British Pharmaceutical Conference to the borders of Derbyshire has afforded me a favourable opportunity of bringing to the notice of the members a short account of a local industry of botanical and pharmaceutical interest, viz., the cultivation of valerian rhizome in Derbyshire. The centres in which herbs are grown in these islands are few in number, but for the pharmacist they always have a special interest. From conversations with old inhabitants of a neighbouring Derbyshire town, Chesterfield, I understand that about fifty years ago numerous herbs were grown in that district; not only valerian, but elecampane, pansies, and other herbs. The father of the two senior partners in the firm of Robinson & Sons, Limited, of Chesterfield, himself a retail chemist, formerly grew considerable quantities of these herbs, and manufactured from them extracts and other galenical preparations, including a syrup of violets. But the land on which these herbs were grown has now been built upon, and at the present day I am only aware of one drug that is grown in Derbyshire in any quantity, viz., valerian rhizome, though small quantities of elecampane are occasionally produced. In Flückiger and Hanbury's *Pharmacographia*, p. 377, the cultivation of valerian is recorded at Ashover, Woolley Moor, Morton, Stretton, Higham, Shirland, Pilsley, North and South Wingfield, and Brackenfield, all parishes in Derbyshire, yielding together, in 1872, about six tons of drug. At the present day there are fewer cultivators, and the yield is considerably less.

Through the kindness of Mr. Greaves, of Chesterfield, I obtained an introduction to Mr. Morley, a farmer living at Skagy

Leg Farm, in the parish of Brackenfield, some two and a half miles from Stretton (Midland) Station. The farm is situated near the small River Amber, and for generations has produced a fair quantity of the valerian of commerce. Mr. Morley has grown it for twelve years, and his predecessor for over fifty years. Mr. Morley was extremely kind in showing me over his fields and giving me full details of cultivation for presentation to the members of the Conference. Not only this, but he invited me to go over to his farm from time to time, whenever a new phase of cultivation was entered upon, so that I might be able to take part in the various operations concerned, details of which I will now put before you in order.

Collection of Wild Plants.

The first point of interest is the collection of wild plants in the spring. It is found that the plants thrive best when collected wild and transplanted in another soil; propagation from seeds is not practised. There are many parts of Derbyshire where valerian, or "Faléry," as it is locally termed, grows wild; but every year the farmers find it necessary to go further afield for the plants, and for this they are responsible. It is always difficult for an outsider, in forming an opinion on agricultural matters, to find out when methods in vogue are based on actual experience and when on traditions handed down. In the present case it would seem worth while to grow a quantity of plants from seeds and compare the ultimate yield with that obtained by the method in vogue. I am inclined to think that the slow growth of the plant and the necessity for the land to be unproductive at least one year in growing from seeds accounts largely for the wasteful method of annually collecting wild plants.

This year Darley Dale was visited, the plants growing in abundance in woods near the Mill Close Mine, close to Wensley, between Darley and Winster. I might mention that you will be about three and a half miles from this spot when visiting Haddon Hall on Thursday. That part of the country is on the limestone, and the plants are found in woods which are both hilly and marshy. Owing to the dense underscrub collection is arduous, and not without risk, for the shafts of disused mines are met with here and there, sometimes only loosely planked over. In one particular case, on looking down, a wooden ladder with iron staves may be seen in a perpendicular position; some twenty staves down there is a landing on which the miner would

turn round and again descend by another ladder, continuing his descent in this way by a number of platforms and ladders. One shaft was ascertained to be about 400 ft. deep by the simple method of dropping a stone from rest. The time of collection depends largely upon the weather; the journey was made this year towards the end of April, but in an early spring the young plants begin to appear in March.

I may remind you that the valerian plant is a perennial, consisting of an erect rhizome from which runners are given off. These runners are slender, and at their end there develop in the usual way young daughter plants. The parent plant will flower year after year, but the daughter plants do not flower the first year or two; they produce, however, a luxuriant supply of leaves, and in the autumn the rhizomes from them are of good quality. In collecting, the farmer gives preference to the daughter plants, and to the younger flowering plants.

Planting.

Having previously dug over and treated the land with yard manure, the farmer next proceeds to set the young plants. This is usually done by hand, the rougher method of ploughing in not giving such good results. The soil at Skagy Leg Farm is a light clay, being on the coal measures. The soil is probably alluvial, owing to the promixity of the river. The plants need a lot of water. Last year it was too wet, and this year it has been much too dry for them. It is advantageous to supply from time to time artificial manure and plenty of liquid manure. Weeding also occupies a great deal of attention.

Topping.

The plants collected will be of two kinds, older plants that will flower the first year, and daughter plants that will not flower the first year. It is necessary to cut the flowering stems off the flowering plants as they appear, leaving only the lower leaves. In this way the whole of the plants' strength will be found in the rhizome in autumn. The flowering stems appear about one month after the plants are set, and, if allowed to remain, produce flowers during June and July, and even in August. It is not unusual to see stray plants here and there, whose tops have not been removed, attaining a height of 5 ft. to 6 ft., and in the case of these older plants the base of the flowering stem may measure from 1 to $1\frac{1}{2}$ inch in diameter.

Digging Up.

About September, or early in October, the whole of the tops remaining above ground are cut off with a scythe and the rhizomes dug up. Were it not for the autumn rains it would be better to leave the plants in the soil until Christmas as the roots increase in size, but the clinging nature of the damp soil late in the year renders it too troublesome an operation to clean the rhizomes. Hence they are harvested earlier. The rhizomes are taken in a shed, and the larger ones sliced longitudinally to facilitate washing the "hearts."

Washing.

This operation is conducted in an expeditious manner in the River Amber. When I visited the farm for the purpose early last December—the wet season had delayed the crop more than a month—the ground was hard with frost, and the somewhat swift stream was too icy cold to render the operation a pleasant one, in spite of the day being bright and sunny. A stout plank was placed across the stream and a large wooden box was secured on one side of it by means of two strong stakes driven into the bed of the stream. The box was perforated with holes and partially filled with the rhizomes, to which damp earth freely adhered owing to the wet season. The water flowed through the box, the depth being about 2 ft. to 2½ ft., and the cleansing was facilitated by stirring the rhizomes with a rake.

Drying.

The final operation consisted in drying the wet rhizomes. For this purpose a large shed was floored about 6 ft. from the ground, the flooring being well perforated, and then strewn with the rhizomes. In the room beneath a large coke stove was set going, and the heating continued until the drying process was complete. The rhizomes so prepared are ready for market, and it will readily be understood that there is constant work for the farmer from March to December, when the drying operations usually come to an end. As you are aware, valerian rhizomes are not bulky, and it takes a great number of plants to produce a hundredweight of dried rhizomes. This year the continued drought has dwarfed the plants somewhat, so that there is not the usual quantity of foliage. As a result, it is expected that the rhizomes this year will be smaller than usual. The finished product is then carted to Messrs. Greaves & Son, Chesterfield,

who distribute it to various parts of the world. It is noteworthy that in spite of the fact that considerable quantities of valerian are grown in the United States of America, the bulk of the Derbyshire yield goes to that country.

Uses.

The value of valerian as a nervine stimulant and anti-spasmodic is well known, but the drug has also been proved locally to have a dental use. I have heard of several cases in which the chewing of the rhizome has caused loose teeth to become set again.

Comparison with Japanese Valerian.

For some years Japanese valerian has been offered in this country under the name of "Kesso," derived, Mr. Holmes tells me, from *V. latifolia*. I am indebted to Mr. F. Ransom for a sample, and have compared it with the home-grown drug. The Japanese drug is bolder in size, and darker in colour. As regards odour, I consider the Japanese to be the more aromatic, but as regards taste I notice a considerable difference, the Japanese rhizome being less camphoraceous and more acrid than the Derbyshire drug, leaving a distinctly bitter taste in the throat, while the Derbyshire rhizome is free from the bitter taste. I hope at a future time to compare the yield of oil from the Japanese and Derbyshire valerians.

Botanical Source.

Some months ago Mr. E. M. Holmes suggested to me the desirability of ascertaining whether the Derbyshire drug was the product of *V. sambucifolia*, Mikau fil., or of *V. Mikauii*, Syme. For some time I have, in conjunction with Dr. Drabble, investigated the matter, and we hope shortly to publish our views. At present we may say in regard to this difficult problem that the balance of evidence in our possession points to *V. Mikauii*, Syme, as the source.

Mr. Martin said the thanks of the Conference were due to Mr. Upsher Smith for bringing the paper before it. His paper was entirely pharmaceutical, and was connected with the remedies of their early days. Latterly there had been many synthetic remedies introduced, but it was not wise on the part of

pharmacists and medical men to forget those old drugs which had served a useful purpose and had stood the test of hundreds of years. Some of the modern synthetic drugs were of value, but many were of little value; and, while pharmacists should grasp the new, they should not forget the old.

Mr. Cross congratulated Mr. Upsher Smith on having so soon got to work in his new neighbourhood. Valerian was fairly common throughout the Midlands, especially in chalky districts, and Mr. Smith should be able to get very good samples in Derbyshire. He was sure the Conference would look forward to further investigations on this subject, which was of great interest.

The President said this paper showed the importance of having matters of local, as well as general, interest discussed at the meetings of the Conference.

The thanks of the Conference were unanimously accorded to Mr. Upsher Smith.

DESIDERATA IN A FUTURE PHARMACOPŒIA.

By F. C. J. Bird.

The eighth decennial revision of the United States Pharmacopœia will shortly be published, and in an article which appeared in the *American Journal of Pharmacy* for June last, Professor Remington, Chairman of the Revision Committee, has foreshadowed the changes which are to be made in the new U.S.P., and has furnished the pharmaceutical profession with information about its most salient features. Our own Pharmacopœia has been in use for six years, and it was thought that much valuable information might be elicited by a discussion at this meeting of the Conference on the chief difficulties which have been met with in the practical and everyday use of the work in pharmacy, and that suggestions might be forthcoming as to the direction in which improvements could be effected in a future edition.

Consideration of this subject also appears the more apropos at the present moment on account of a letter from the Chairman of the Pharmacopœia Committee of the General Medical Council to the President of the Pharmaceutical Society, which was read at the Council meeting on July 6 last, and in which it was stated that the Pharmacopœia Committee had for some time been

considering in what manner the various inquiries which are still necessary in connexion with the next revision of the British Pharmacopœia might best be organized. This letter indicates that the accumulation of information which shall assist in the revision of the Pharmacopœia is being actively proceeded with, and I trust that members of the Conference will freely give the result of their practical experience, so that difficulties connected with the use of the Pharmacopœia may be pointed out, and the general lines indicated on which, from the pharmacist's point of view, there may be produced in the next edition a pharmacopœia second to none amongst the pharmacopœias of the world.

One of the greatest faults of the 1898 B.P. which I have had to contend with in my own experience has been the absence in many cases of definite limits of impurity in medicinal substances, especially chemical salts. The expression, "only the slightest reaction," particularly has proved a source of trouble, the occurrence or not of a "slightest reaction" depending so much on the manner in which the test is carried out. Say that a sample of an ordinary chemical salt is in question—it has happened that the purchaser, working with a considerable quantity and obtaining what he considers a copious precipitate, has rejected the sample on the ground that it did not pass the test of the Pharmacopœia. The manufacturer, with a small quantity of substance tested in dilute solution, has maintained that the slightest reaction for a certain impurity only was afforded, and that the substance did pass the tests of the Pharmacopœia. Whilst official statements remain vague and indefinite, the impossibility of satisfactory agreement in such cases is obvious. The complete removal of impurities, harmless from a medicinal point of view, may be both difficult and costly, and there may be no corresponding increase in medicinal value; it is therefore a desideratum in the next Pharmacopœia that the amount of innocuous impurity permissible be properly defined. Limits may be fixed by directing the reagent to be added either to a solution of a given strength or, as in the U.S.P., to a stated weight of the substance previously dissolved in a given volume of water. A test so expressed would not admit of dual interpretation. Perhaps it might be preferable to give a general direction that all qualitative testing be carried out in a 10 per cent. solution of the chemical salt under examination, except in those cases in which the substance was not soluble to that

extent, when the strength of the solution to be tested would be specified. It would be a great advantage if a statement were made of the percentage of pure substance required as the standard of medicinal purity for each B.P. chemical; the difference would then indicate the limit for total innocuous impurities. This declaration of percentage of pure substance and limit of innocuous impurity will be one of the features of the new U.S.P.; it will be placed immediately after the official title and English name of the article. To fix such limits in our own Pharmacopœia will require much careful work, for the B.P. at present is very unsatisfactory in this respect, and, whilst the standard of medicinal efficacy should be rigorously upheld, yet such latitude in the amount of harmless impurities should be permitted as not unduly to complicate or add to the cost of manufacture.

Difficulties, involving much correspondence and difference of opinion, have frequently arisen during the last few years relative to the presence in B.P. chemicals of impurities of a harmful nature, such as lead, arsenic, etc., and it is most important that exact limits for such impurities be stated, and that in addition more detailed instructions be given for applying tests. Under borax, for example, occurs the statement that it should yield no characteristic reaction with the tests for arsenic, but it is quite easy with the delicate modifications of the B.P. tests now available to obtain a very characteristic reaction for arsenic with nearly all samples of borax; it is therefore in this case simply a question of the amount present and not of absolute freedom from arsenic; so with lead in tartrates, citrates, ammonium carbonate, etc. It is to be hoped that limits will be laid down in the next Pharmacopœia for all dangerous impurities, much information and many suggestions having now been published, so that the principle of limiting dangerous impurities, rather than requiring their complete absence, may be extended to all B.P. chemicals.

The vexed question of the status of the Pharmacopœia as a work of reference or standard under the Sale of Food and Drugs Act has great interest for pharmacists, and certainly should receive some consideration. Legally perhaps the B.P. is not a standard in a court of law, and probably its compilers never intended it to be one, as they merely state in the preface to the B.P. "that the Medical Council has always desired in the British Pharmacopœia to afford to the members of the medical profes-

sion and those engaged in the preparation of medicines throughout the British Empire one uniform standard and guide whereby the nature and composition of substances to be used in medicine may be ascertained and determined." In courts of law, however, the B.P. has been accepted and recognized as a standard authority on substances mentioned therein, and it seems desirable that in the compilation of the monographs this fact should be kept in view, especially if the introduction of figures bearing on the specific gravity, extractive, etc., of galenical preparations be contemplated. A good deal of work has been done in this direction (e.g., C. G. Moor, "Standards," and J. C. Umney, "Standards for Medicines," *The Pharmaceutical Journal*, November 15, 1902), but it is very necessary that all figures should be exhaustively confirmed, and the processes concerned rendered perfect, before the final adoption of standard figures in the characters and tests of drugs or preparations. Reasonable allowance should also be made for alteration in the composition and physical characters of the latter during manufacture and storage.

When a B.P. monograph refers to an article used both in medicine and for other purposes, e.g., beeswax, ammonium carbonate, etc., fresh difficulties arise, and, in the past, a good deal of trouble has been caused by the British Pharmacopœia being regarded as a standard for commercial articles. When we reflect that it has been shown quite recently (Johnston, *Chemist and Druggist*, July 14, 161) that ammonium carbonate not of the B.P. standard is better for use in baking than that answering the B.P. tests, it is obvious that the same standard is not necessarily suitable for both medicinal and commercial substances. A clear statement in the preface that the descriptions used in the text of the Pharmacopœia were intended to apply to medicinal substances only, and not necessarily to substances known by the same name but required for other purposes, together with a free use by the pharmacist of the word "medicinal" as distinguished from all other varieties of the article vended, would, I think, do much to clear away this difficulty and prevent vexatious interference with the chemist in the conduct of his business.

Several of the assay processes of the Pharmacopœia will require further investigation. On account of their defects a point is raised which is likely to an extent to affect the uniformity of some products: for example, the B.P. assay processes for

certain drugs—opium, belladonna, etc.—give a result below the truth, whilst statements are made in the B.P. that the several preparations should contain a certain percentage of alkaloid. Now, in standardizing a galenical preparation it becomes a question as to which should be taken, the stated strength of the preparation in alkaloid, as shown by another and more accurate method of assay, or the percentage strength given by the official process. Although I think that for uniformity the official process should always be adopted, even if incorrect, there are others who will hold a contrary opinion.

It would be interesting to know to what extent metric weights and measures in the B.P. formulæ have been found advantageous. They are certainly useful in showing at a glance the percentage of ingredients and when working on a large scale with quantities in hundreds of pounds, but it will probably be a long time before the metric quantities given in the B.P. formulæ will replace the imperial weights and measures in the everyday work of the laboratory. It seems probable that both sets of figures will have to be retained in the next Pharmacopœia.

This short paper, having for its object merely the opening of a discussion on the directions in which the present Pharmacopœia can be improved from the pharmacist's point of view, as shown by practical experience during the last six years, I have only touched on a few points in a general way, but trust that it may be the means of eliciting an expression of opinion on the subject by members of this Conference, which at the present juncture should serve a very useful purpose.

REPORT UPON THE RESULTS OF EXAMINATION OF PHARMACEUTICAL PREPARATIONS BY THE ANALYSTS OF THE POOR-LAW UNIONS OF IRELAND FOR TWO YEARS ENDED MARCH 31, 1904.

By J. E. Brunker, M.A.

A very large number of samples of pharmaceutical preparations is examined yearly by the Union analysts, which are taken from the medicines supplied by contractors for the use of the sick poor of Ireland.

A careful records have been kept of the results obtained during the past two years, I have thought that it would be

of interest to the Conference to learn the averages of the figures reported by the analysts, if only on account of the large number of samples examined. Annexed will be found tables in which are shown the average percentages for extractive and alcohol of I. Liquid Extracts, II. Liquors, III. Tinctures.

These averages are placed side by side with the minimum standards which the Local Government Board for Ireland have suggested for the guidance of the analysts. These averages have been obtained by eliminating the comparatively small number of samples which appeared to be abnormal by reason of excesses or deficiencies, the number of which was only about 3·5 per cent. No value is claimed for these results beyond what is really their due. Dealing with the British Pharmacopœia as it stands, they form the only basis upon which we can at present form an opinion upon what the formulæ of the Pharmacopœia will give us.

As regards the percentage of extractive, it must be admitted that it gives little or no information as to the therapeutic value of certain of the drugs to be found in the tables. This applies to preparations of such drugs as jaborandi, gelsemium, hyoscyamus, etc., for which an alkaloidal standard can and ought to be adopted. Until such standards have become official we can only deal with such facts as are at our disposal.

It will be seen that the averages recorded bear a fair relation to the minimum standards adopted by the Local Government Board; and, after two years' trial, the modifications which appear to me to suggest themselves are few in number and small in amount.

TABLE I.—LIQUID EXTRACTS.

Liquid Extracts.	No. of Samples.	Range of Specific Gravities.	Average Extractive, Gm. in 100 c.c.		Average Alcoholic Strength (by Vol.).	
			L. G. B. Minimum Standards Per Cent.	Average Percentage Per Cent.	L. G. B. Minimum Standards Per Cent.	Average Percentage Per Cent.
Cascaræ Sagradæ	529	1·054–1·07	20	23·7	17	18·0
Ergotæ . .	195	1·014–1·028	12	14·0	30	32·0
Glycyrrhizæ	37	1·114–1·135	40	43·0	17	17·8
Opii . .	20	—	—	—	17	17·8
Pareiræ . .	7	1·04–1·06	17	18·4	21	22·0
Total . .	788					

Table II.—Liquors.

Liquors.	No. of Samples.	Range of Specific Gravities.	Average Extractive, Gm. in 100 c.c.		Average Alcoholic Strength (by Vol.).	
			L. G. B. Minimum Standards Per Cent.	Average Percentage Per Cent.	L. G. B. Minimum Standards Per Cent.	Average Percentage Per Cent.
Calumbæ Conc.	160	0·993–1·00	3·3	4·0	18·0	20·0
Chiratæ Conc.	29	0·996–1·00	4·0	4·3	18·0	20·0
Hamamelidis	27	0·980–0·986	0·03	0·042	16·0	17·0
Picis carbonis	17	0·858–0·866	2·75	3·6	80·0	82·5
Quassiæ conc.	103	0·976–0·980	0·25	0·44	18·5	19·8
Rhei . .	44	1·018–1·026	10·0	12·7	17·0	18·5
Sarsæ . .	27	1·02–1·04	8·0	11·0	19·0	20·0
Senegæ . .	138	1·0–1·04	10·0	12·0	21·0	22·5
Sennæ . .	16	1·01–1·05	11·0	14·0	18·0	20·0
Total . .	561					

Table III.—Tinctures.

Tinctures.	No. of Samples.	Range of Specific Gravities.	Average Extractive, Gm. in 100 c.c.		Average Alcoholic Strength (by Vol.).	
			L. G. B. Minimum Standard Per Cent.	Average Percentage Per Cent.	L. G. B. Minimum Standard Per Cent.	Average Percentage Per Cent.
Aconiti . .	13	0·890–0·895	1·2	1·24	65·0	66·6
Arnicæ . .	6	0·891–0·895	0·45	0·89	65·0	68·4
Asafetidæ *	2	—	10·0	7·8	65·0	66·8
Aurantii .	130	0·877–0·887	1·8	2·0	72·0	74·0
Belladonnæ	92	0·911–0·916	0·5	0·9	57·0	59·6
Benzoini comp. .	64	0·890–0·905	16·5	17·8	73·0	74·9
Buchu . .	68	0·925–0·933	3·5	3·85	54·0	56·7
Calumbæ .	218	0·915–0·922	0·8	1·0	53·0	56·6
Camphoræ comp. .	908	0·915–0·920	0·33	0·36	57·0	58·5
Cannabis indicæ .	9	0·845–0·847	3·5	4·0	87·0	88·0
Cantharidis	3	0·837–0·840	0·15	0·25	85·5	87·0
Capsici . .	54	0·890–0·896	0·8	1·22	66·0	69·3
Cardamomi comp. .	254	0·940–0·950	6·0	7·0	54·0	55·6
Catechu .	80	0·975–0·982	15·0	16·6	50·0	52·0
Chloroformi et morphinæ	87	1·010–1·020	32·0	32·6	44·0	45·0

* The only samples examined were much below standard.

Tinctures.	No. of Samples.	Range of Specific Gravities.	Average Extractive, Gm. in 100 c.c.		Average Alcoholic Strength by (Vol.).	
			L. G. B. Minimum Standard Per Cent.	Average Percentage Per Cent.	L. G. B. Minimum Standard Per Cent.	Average Percentage Per Cent.
Cinchonæ .	301	0·915–0·924	4·5	6·3	63·0	65·0
Colchici sem.	19	0·950–0·956	2·5	3·4	41·0	43·25
Digitalis .	348	0·930–0·935	3·0	3·86	53·0	55·5
Ergotæ ammon. .	21	0·932–0·937	3·5	4·35	51·0	52·6
Ferri perchloridi .	315	1·085–1·110	–		22·0	23·0
Gelsemii .	7	0·920–0·923	1·0	1·37	53·0	55·0
Gentianæ comp. .	391	0·965–0·969	5·0	5·17	41·0	43·5
Guaiaci ammon. .	8	0·895–0·898	13·0	13·5	70·0	73·3
Hydrastis .	18	0·919–0·926	2·0	2·18	55·0	58·0
Hyoscyami	163	0·950–0·958	2·3	3·0	42·0	43·5
Iodi . .	84	0·874–0·880	—	2·7	85·0	86·35
Jaborandi .	10	0·951–0·958	3·0	3·4	41·0	44·2
Jalapæ . .	9	0·905–0·908	3·5	4·2	66·0	67·6
Kino . .	12	0·995–1·0	19·0	22·6	45·0	48·0
Lavandulæ comp. .	38	0·836–0·840	0·4	0·66	87·0	88·0
Lobeliæ ætherea .	19	0·815–0·821	1·0	1·66	62·0	64·0
Myrrhæ .	17	0·847–0·857	4·5	5·2	83·0	85·3
Nucis Vomicæ	296	0·906–0·916	2·0	2·55	62·0	64·0
Opii . .	330	0·950–0·962	3·0	3·67	42·0	44·0
Podophylli .	15	0·847–0·853	3·5	3·65	86·0	87·0
Quininæ .	52	0·885–0·891	3·2	3·65	72·0	74·0
Quininæ ammoniata .	68	0·923–0·928	1·8	1·8	52·0	54·0
Rhei comp.	117	0·967–0·975	14·8	16·0	48·0	50·5
Scillæ . .	247	0·960–0·970	9·0	12·0	51·0	53·5
Senegæ . .	160	0·935–0·945	6·0	6·6	54·0	56·0
Sennæ comp.	37	0·985–0·997	9·0	10·3	38·0	40·0
Stramonii .	10	0·955–0·965	3·8	4·0	41·0	42·0
Strophanthi	26	0·890–0·893	0·45	0·6	66·0	68·0
Valerianæ ammon. .	30	0·933–0·942	3·5	3·8	52·0	54·0
Zingiberis .	92	0·837–0 843	0·4	0·56	87·0	88·5
Total . .	5,246					

Mr. J. C. Umney said he had been asked by Mr. Brunker to read his paper containing the results of some analyses of pharmaceutical preparations submitted for examination by the

Poor-law Unions of Ireland. Mr. Bird had referred to the extreme importance of giving in the Pharmacopœia figures for extractive, in view of the circumstance that those figures were made the basis of prosecutions under the Sale of Food and Drugs Acts. Prosecutions had been taken in regard to vinegar of squill, compound tincture of benzoin, decoction of aloes, and similar preparations, on account of the extractive, and the paper by Mr. Brunker was, therefore, important, as it dealt with pharmaceutical preparations which had been submitted for analysis. Referring to Mr. Bird's paper, Mr. Umney said he thought too much stress could not be laid in the future B.P. on the standards for limits of impurity. It was not necessary to strive after extreme purity if that was to be obtained only at extravagant cost, and he hoped that in future pharmacopœias the limits of impurity would be properly considered and set out. He thought the figures of Mr. Brunker had the very greatest importance and value, in view of the prosecutions which had been taken recently with regard to the extractive of certain tinctures and other galenical preparations.

Mr. Tyrer thought that, in the interests of public health, of medical men, chemical manufacturers, and pharmacists, something definite should be stated in the Pharmacopœia in regard to limits of impurity. He thought it would be enough if the B.P. stated definitely what was the minimum of impurity; in, for instance, calcium phosphate or potassium bromide. He entirely adopted Mr. Umney's suggestion that there should be no difficulty with regard to the cost of purification, within due limits. Members knew how tempting it was to buy things because they were cheap, but it was infinitely better to buy a good article and to go to a little trouble, if necessary, in obtaining it. It had become a necessity for those who were concerned for a high standard of excellence for their products to see that there was analytical control from top to bottom. And very much depended upon that much-maligned test-tube which certain professors seldom employed themselves, and consequently condemned the use of. With regard to the question of weights and measures, he was sorry that Mr. Bird had adopted the word "metric;" he thought "decimal" was the right system, and our weights and money might be decimalized with comparative ease.

Mr. Glyn-Jones said one of the difficulties from which pharmacists suffered was the difficulty of bringing together

all those who prepare the British Pharmacopœia with those who administer the Sale of Food and Drugs Acts. He thought if in any future British Pharmacopœia something could be done to embody in the Pharmacopœia some of the statements of its past-Editor, Dr. John Attfield, in his report on the 1898 Pharmacopœia, on many points which lawyers now used to the injury of chemists, very useful results would follow. It had been complained by the compilers of the B.P. that they did not intend that the Pharmacopœia should be set up as a standard for the purposes of the Sale of Food and Drugs Acts and the Merchandise Marks Act ; but the fact of putting in the Pharmacopœia synonyms such as nitre, saltpetre, and liver of sulphur, made it quite clear that the purpose was to set up standards for those articles—at any rate, for those used as domestic remedies. He did not quite accept Mr. Bird's statement that the B.P. was not a legal standard. He believed that the Pharmacy Act, 1868, made the Pharmacopœia a statutory standard for the compounding of medicines of the B.P. ; he thought Section 15 of the Act made that quite clear. And he was sorry that the Pharmaceutical Society had not done something to administer that section of the Act. He believed the public would be safer in the hands of the Pharmaceutical Society than in the hands of public analysts who had had no training in pharmacy which entitled them to set up standards and to judge pharmaceutical preparations. The force of that would be appreciated when he said that a public analyst the other day stated that he should condemn potato starch if sold by a chemist, but should not condemn it if sold by a grocer. He suggested that the compilers of the Pharmacopœia should place asterisks against the articles which were used for purposes other than medicinal, and they should state that the standards for articles so marked only applied to such articles when used in medicine. It was time they gave up saying that they did not intend to fix standards for commercial articles mentioned in the Pharmacopœia. If the Pharmacopœia said there should be no reaction for lead, it was of no use putting a pharmacist in the witness-box to say that the article could not be obtained free from lead—the compilers of the B.P. should take great care what language they used. Another point which wanted emphasizing was that analysts were too prone to seize on one little characteristic of an article and condemn it on that characteristic alone. He did not blame public analysts for doing so, because they were wretchedly

paid, and they found it was not possible to submit articles to an exhaustive analysis for the whole of the characteristics of the article for a fee of 10*s.* 6*d.*, and he thought the Pharmacopœia authorities should indicate in some way that before an article was condemned and proceedings taken, the various characteristics of the sample should be investigated and considered as a whole. It seemed to him that if the members of the Executive Committee of the Conference would constantly keep before them the fact that whether they liked it or not the B.P. was regarded as a legal standard—or, at any rate, very strong evidence—he thought they would be able to bring such influence to bear upon the Pharmacopœia authorities as would help to smooth the difficulties before those chemists who wished to carry on their business with strict honesty.

Dr. Symes said that, although it seemed absurd for a public analyst to say that potato starch bought from a chemist would be condemned, whereas it would not be condemned if bought from a grocer, yet the public analyst was quite right, and was perfectly consistent with the section in the Pharmacy Act referred to by Mr. Glyn-Jones. Unfortunately, that section did not enable the Pharmaceutical Society to deal with the matter at all, as it was held that the section applied to registered persons only, and not to outside persons. If that was so, he thought it would be unfair for the Pharmaceutical Society to prosecute qualified persons, and have no power to proceed against unqualified persons.

Mr. Naylor said it was eminently desirable, in fixing the standard of any article of the B.P., that regard should be paid to the conditions under which the article was sold, especially to the fact that particular preparations have to be stored by the chemist, and stored not always under the most advantageous conditions. Therefore, where preparations contained substances which were liable to deteriorate and change, or more particularly in the case of volatile substances, every regard should be paid to the fact. It should be borne in mind that there were many preparations which the chemist purchased and could not supply to customers direct from the original package of the standardized preparation; and that these preparations, in addition to being transferred from the stock bottle to the shop bottle, were subject to the varying conditions of temperature, from winter's frost to summer's heat. He was afraid that standards had been fixed after preparations had been kept a short time only; but if

practical pharmacists were officially connected with the production of the Pharmacopœia, such little points as he had mentioned would not be lost sight of.

Mr. H. Wippell Gadd agreed with Mr. Bird that it would be useful if there were limits of poisonous impurities, but he did not think the same limits should apply to harmless impurities. There was a good deal in the little word "about"—it was a word which saved much trouble. With regard to standardized preparations, they were very useful, and he was much interested in the figures brought before the Conference by Mr. Umney. He thought, however, that there was much force in what Mr. Naylor and Mr. Glyn-Jones had said. If the suggested standard for extractives were given in the Pharmacopœia, Mr. Glyn-Jones had told them that the lawyers would take them for gospel, and Mr. Naylor had shown that there was a difficulty in conforming with rigid standards. To his mind, these standards were very useful as a check in laboratory work, but to make them official standards was another thing altogether. Standards were badly wanted for certain preparations—extract of Indian hemp, for instance. He thought a standard might very well be fixed for its solubility in alcohol, and for its solubility in ether. Mr. Gadd next referred to compound tincture of benzoin, and mentioned the late Mr. John Barclay's suggestion as to the amount of aromatic acid it should contain. He agreed with Mr. Bird that it was best to use the official methods of assay for alkaloidal preparations even if other processes gave more accurate results. It was better, in such cases, to be uniformly wrong, than spasmodically right.

Mr. Martin said he thought there should be some precise physical conditions under which the tests of the B.P. should be applied. How many, he asked, would now pass certain substances as arsenic free which would have been passed a short time ago? The word "standardisation" seemed to possess a fascination for some people almost like the old word "Mesopotamia." He did not believe in standardising things unless they knew what was meant—say, the standardisation of alkaloids, unless they knew what alkaloids were medicinally active substances in the drug. Then in regard to standards for inert matter. It might be that in some years a drug would contain more inert soluble matter than in other years, and they must be very careful indeed in fixing standards, because they were creating greater difficulties for themselves unless they were ab-

solutely sure of the basis on which the standards were founded. With reference to Imperial weights and measures, every pharmaceutical worker used the metric system in the laboratory, but he hoped that in dispensing and in the ordinary business of a chemist they would keep to the Imperial weights. Mr. Martin concluded his remarks by expressing the hope that the production of the Pharmacopœia would be in the hands of medical men and pharmacists of wide views, who, in their collective wisdom, would secure for chemists in business a Pharmacopœia that would be practical and good for the purpose for which it was intended.

Mr. Cross wished to correct a misapprehension on the part of Dr. Symes in regard to Section 15 of the Pharmacy Act. Dr. Symes said the Pharmaceutical Society could only prosecute chemists for not compounding in accordance with the formularies of the B.P. ; but Section 15 made four offences in addition to the use of titles. It stated that (1) a person shall not keep open shop, nor (2) shall he sell, nor (3) shall he manufacture his drugs and galenicals in any other way than that ordered in the B.P., nor (4) shall he neglect to observe the poison regulations which are set in force from time to time. Thus they had clearly a right to prosecute outsiders.

A cordial vote of thanks was accorded to Mr. Bird for his paper.

Mr. Bird, in replying to the various speakers, said, with regard to what Mr. Umney stated, it was very satisfactory that the figures of the Local Government Board had been so well prepared. Of course, they must remember that it was necessary under the Sale of Food and Drugs Acts, that analysts should examine pharmaceutical preparations, and really, the only figures they had to go upon were the figures for extractives, specific gravity, etc. Therefore, pharmacists were particularly concerned in having those figures correct. He agreed with Mr. Tyrer that the word "decimal" was better than "metric." Mr. Glyn-Jones had said that he was wrong in stating that the B.P. was not a legal standard. He (Mr. Bird) said, "Perhaps it is not a legal standard," but knew that it was held by many to be a legal standard. He thought the suggestion as to placing asterisks before certain preparations was a very good one, and that it might be more effective than his own proposal. Mr. Glyn-Jones had also shown very clearly how numerous were the difficulties met with in using the present B.P. With regard to the distinction in the magistrates' mind between the grocer

and the chemist, he thought Mr. Cross had replied to Dr. Symes. Mr. Naylor had said that preparations had to be stored, and in fixing standards the influence of time should certainly be taken into consideration. He was not of Mr. Gadd's opinion that there should be no limit for innocuous impurities. He agreed with Mr. Martin's remarks about tests for arsenic—testing for minute quantities of arsenic had become quite an exact science. With regard to standardisation, he thought that, whilst in many cases the extractive in a preparation did not represent its medicinal activity, they must remember that the figures for extractives were not based on a few samples, but were the average figures obtained from a great number of samples, and he thought on those averages they had very fair grounds for judging the quality of the preparations. There was one point he had not mentioned, and that was that the General Medical Council had determined to publish the results of investigations in the future, so that they might be criticized before being adopted in the B.P. He was very gratified that his paper had produced such an interesting discussion.

PRELIMINARY NOTES UPON SANSEVIERA THYRSIFLORA.

By Frederick Davis.

The plant *Sanseviera thyrsiflora*, indigenous to South Africa, belongs to the natural order Liliaceæ, and is largely used in its fresh state as a remedy for piles. Many other species of the same family, such as *Sanseviera zeylanica*, are the source of a very strong and tough fibre, known commercially as "bow-string hemp."

It was noticed during the African campaign that Boers suffering from hæmorrhoids dug up a portion of the rhizome, freed it from extraneous matter, trimmed off the outer integuments, and chewed the inner portion, swallowed the extractives, and rejected the fibres, which remained as a tangled mass in the mouth after chewing. Captain Tremlett, observing this, ascertained that in each case a cure was effected; and, desiring to know more of the remedy, a quantity of the rhizome was sent to an English consulting physician, who directed me to ascertain the best methods of preserving the extractives without impairing

the physiological action, and if possible determine the active constituents.

There is practically no literature upon the subject, but I notice in Professor Andrew Smith's *Contributions to the South African Materia Medica* the following remarks: "This plant is to be seen frequently beneath trees and in thickets—with its sword-shaped, leathery leaves with a border, and zigzag white markings. Its root is given by Dr. Pappe as used for piles. The Kaffirs employ a decoction of the rootstock to expel all kinds of worms. An experienced native declares it to be very efficacious."

The plant is known in Africa as Sikolakota, and by the Kaffirs as "Isi Kolakota." My researches seem to prove the rhizome contains (1) a glucoside, (2) a globulin, (3) an albumen. The globulin and the albumen reside principally in the phloem of the fibro-vascular bundles, whilst the glucoside is found chiefly in the inner portion of the outer integument, and the ground tissue. It will be imperative, therefore, in making any extract or other preparation from this plant, that the whole rhizome be employed, or the entire medicinal constituents will not be obtained. Secondly, I am of opinion that any medicinal preparation of this plant should be made from the fresh rhizome, because if partially dried, fermentation would set up, with the consequent decomposition of the active principles, and its efficacy as a medicament would be destroyed, whilst the entirely dried rhizome, although free from the objection of enzymotic change, is found to be less active for the purpose for which it is intended, and, in addition, if not dried quickly, and at a low temperature, its colour suffers markedly.

The best preparation pharmaceutically, and most active physiologically, has been made by the following simple method:—

Press out the juice from the fresh rhizome, filter and preserve by the addition of 20 per cent. of glycerin. The addition of ethylic alcohol impairs the physiological action. The character of the glucoside found somewhat resembles that of glycyrrhizin, from ultimate analysis it is probably identical $C_{14}H_{63}NO_{18}$. The substance is optically inactive, and several separately obtained samples varied in melting point between 178° and 200°.

It must be distinctly understood the above preliminary statement does not profess to be the exhaustive results, as indications have already been obtained of the presence of another important constituent.

GENERAL BUSINESS.

The Late Mr. A. H. Allen.

Mr. Gerrard said he had a duty to perform with which he was sure they would all sympathetically agree. The meeting should not be allowed to close without a reference to the sad loss which the Conference and Sheffield itself, and also the chemical profession and public analysts especially, had sustained in the loss of their distinguished member Mr. A. H. Allen, who had passed away since their last meeting. Not to ask them to pass a resolution of condolence with Mr. Allen's widow and family would be a very serious oversight. Mr. Allen was not only a distinguished pharmacist, but he became a distinguished analyst. He (the speaker) felt, and many of his hearers would feel, that they had lost a very great friend indeed. In the early days of the Conference Mr. Allen attended the meetings very regularly, and read many useful and valuable papers. He proposed "That we, the members of this Conference, express our deepest sympathy with the family and relatives of the late Mr. A. H. Allen, and that a letter of condolence expressing our feelings be sent from this Conference to the members of his family."

Mr. Rutherford Hill, in seconding, said he had long known Mr. Allen by repute for his splendid work, and at the Conference of 1892 he had the pleasure of making his personal acquaintance. On that occasion he well remembered Mr. Allen was the most brilliant man on the platform at their scientific meetings, and the soul of all the social gatherings. Mr. Tyrer had referred to the value of compilation of scientific work. Mr. Allen had the unique quality of originality and the power of compilation, and the distinguished characteristic of his monumental work on *Commercial Organic Analysis* was that the processes there enumerated and collated had been, to an astonishingly large extent, submitted to critical examination by the author himself, and in that lay their peculiar practical value.

The resolution was carried in silence, all present rising.

The Late Mr. W. Ward.

Mr. G. T. W. Newsholme then proposed:—"That this Conference expresses its deep sympathy with the relatives

of the late Mr. William Ward." He said that when the Conference visited Sheffield twenty-five years ago Mr. Ward was the Chairman of the Local Committee, and those who were present on that occasion would remember with what great ability and geniality he carried out the whole of the Conference work. It was his good fortune, when he came to Sheffield, twenty-seven years ago, to be very early drafted into the Sheffield Pharmaceutical and Chemical Society by his good friend and predecessor Mr. Radley. At that time Mr. Ward occupied a very prominent position in that Association, and he was for many years—until within a short time of Mr. Ward's death, in fact—associated with him in the work. Old members of the Conference would know what a very active man Mr. Ward was. He occupied the prominent position of Local Secretary of the Pharmaceutical Society of Great Britain for the Sheffield district when that district had one representative. As a pharmacist, he always had at heart the interest of the Pharmaceutical Society and of the Conference. It was to men like Mr. Ward that the Conference, and pharmacists generally, owed a deep debt of gratitude.

Mr. G. SQUIRE seconded. He said on such occasions as these words inadequately expressed their sense of the loss of men who had been respected, and who had done good work. Such a man was Mr. William Ward, and he thought it was the duty of the Conference to pass a vote of condolence with his relatives.

The resolution was carried in silence.

PRESENTATION FROM THE BELL AND HILLS FUND.

The PRESIDENT said one of the pleasing duties of his position was to make a presentation each year to the local organization of the town visited. This gift was instituted by Thomas H. Hills, who gave a sufficient sum of money for the purpose, and who wished the gift to be associated not only with his name, but with that of his predecessor, Jacob Bell. The intention of the presentation was that it should be added to a library if one existed, or should stimulate the founding of a library where there was not already one. The selection of books was usually made by the Local Committee, and he had pleasure in handing them to Mr. Newsholme. The selection comprised Dallenger's

Microscope, Greenish's *Materia Medica*, Blyth's *Foods*, Ringer's *Therapeutics*, Greenish's *Food and Drugs*, Squire's *Hospitals Pharmacopœias*, Cooley's *Cyclopœdia*, and Quain's *Dictionary of Medicine*.

Mr. NEWSHOLME, in receiving the volumes on behalf of the local Association, said they would be exceedingly interesting to that body. Twenty-five years ago a set was presented to them, which had been of great value to the members.

PRESENTATION TO MR. F. RANSOM.

The PRESIDENT said his next pleasing duty was to ask them to join him very cordially in expressing their regard and esteem for their past Secretary, Mr. Ransom, and to ask Mr. Ransom to receive at their hands a small token of their esteem. Mr. Ransom bore a name that was honoured not only in pharmacy but in other spheres. He brought to them that honoured name when he accepted the hon. secretaryship of the Conference, and succeeded other men who were held in honour amongst them, such as Naylor, Thresh, Plowman, Carteighe, Benger, Reynolds, and last, but not least, Dr. Attfield. How well he had done his work was known to all of them. His attendances not only at every meeting of the Conference, but at the meetings of the Executive and other committees, had been, he (the President) believed, without a single default. Only those who had been honoured by being put in such a position as he occupied that day could realize the amount of work Mr. Ransom had had to do, and how well that work had been done. Mr. Ransom's presence with them had almost every year been graced also by the attendance of Mrs. Ransom. She had added much to the pleasure of the gatherings, and they had every indication that she had been of considerable service to her husband in his work. He need scarcely refer to the advancement of pharmacy during the period that Mr. Ransom had held office. He believed Mr. Ransom had made almost every member of the Conference his friend—he did not think he would be going too far in saying that a very large number of them loved him. They desired, therefore, to place on record that love and regard. In the first place, they asked him to accept an album containing some scores of names—not the whole of those who felt regard for him by a long way, but a very large number of them. He had also to

present to him (although it was not there that day) a desk, which he hoped would be very valuable to Mr. Ransom in continuing by correspondence his connexion with those very many friends that he had made in his official capacity. Still more he wished to present Mr. Ransom with a time-keeper. They could scarcely hope that all the time that would be recorded by that watch would be good and pleasant time—that would be too much for any human being to expect—but they trusted that it would record very many happy minutes, hours, and years, and that Mr. Ransom would have all honour in his future career. They prayed that God's richest blessing might be showered on him during the whole of his life, and on those who were dear to him.

Mr. N. H. Martin said it was one of the privileges of old age to have an opportunity of joining in such pleasurable functions as this. He should have been sorry if the presentation had been made to his old friend Mr. Ransom—and he was old enough to count Mr. Ransom's father amongst his friends—without his being able to endorse all that the President had so well said with regard both to Mr. and Mrs. Ransom. One could not speak too highly of the charm which a wife such as Mrs. Ransom cast over a man's life. He had had the privilege of enjoying their hospitality in their charming home, and what Mrs. Ransom was to them when she visited the Conference she was, to a much larger degree, to her charming boys and her husband. If anything could make the hours to be registered by that watch move slowly, pleasantly and happily, it would be that Mrs. Ransom would be spared for many years to grace that home. Mr. Ransom worked with Mr. Naylor for eleven years, and, when they presented the testimonial to Mr. Naylor, he hoped that Mr. Ransom's private duties would allow him to remain as one of the secretaries for a further period. Mr. Ransom did remain long enough to ensure that the continuity of the Conference would not be broken—he remained two years more.

Mr. W. A. H. Naylor said he did not suppose there was any one in the room who knew as he knew the large amount of self-sacrificing work which Mr. Ransom had done, and done whole-heartedly, for the Conference. The Conference had gained immensely by his great labours. It was not so much for them that day to refer to that which was past as to assure Mr. Ransom that he had their very best wishes for a long, happy, useful life, that he might have health and strength granted him, and suffi-

cient leisure to be able to continue to contribute as he had done so freely in the past, to future Conferences.

Mr. R. A. Robinson assured Mr. Ransom that not merely among the members of the Conference, but among all the members of the Pharmaceutical Society, his work had been watched, and very much appreciated. They were glad, indeed, to see that public testimonial to the excellent work he had done for the Conference for so many years. In his quietness, and in that spirit of self-abnegation which was so rare, but so delightful when it was displayed in public men, the Conference recognized that he had been one of the best secretaries it had ever had. He congratulated Mr. Ransom upon the appreciation shown him by his fellow members, and assured him that the Pharmaceutical Society were heartily glad to see his worth so recognized.

Mr. Ransom, who had a very hearty greeting on rising to reply, said he felt that words were quite inadequate to express his feelings. On his retirement last year they very kindly expressed their thanks to him for any work that he had done in connexion with the office of Secretary, and he felt that that was really quite sufficient acknowledgement for anything that he had done. During the greater part of his official career he had the inestimable privilege of being associated with his friend Mr. Naylor, whose experience, tact, and energy were quite sufficient to account for any success that might have attended the Conference during that time. On Mr. Naylor's retirement he had the good fortune to secure as his colleague Mr. Peck, who, by his ability, had already proved wholly his fitness for the position. To those gentlemen, and to all other officials and members of the Executive he owed a debt of gratitude for their unvarying kindness and consideration which he felt he could never repay. Although feeling his unworthiness to accept the testimonial which their generosity had provided, he assured them that he should value it most highly. Both the desk and the watch would be constant reminders of the appreciation of his friends of any efforts which he had made on behalf of the Conference, and of their very kind consideration in passing over the many failings which he was sure they must have noticed. He thanked them most sincerely for the kind words they had spoken, and for the book which accompanied the testimonial. He thanked them also for the very kind words they had spoken respecting his wife, who, as had been said, had certainly ably assisted him in his various duties. With reference to the future, he believed that the Con-

ference, under the present management, had the promise of a very great success. It was not encumbered with any official restrictions, and opened its doors wide to all those who were either directly or indirectly connected with pharmacy. He felt that such an association deserved even fuller support than it had at present, and that it had a long period of prosperity before it.

Place of Meeting for 1905.

Mr. Gibson said that it afforded him the very greatest pleasure to be present with his colleagues and give to the Conference a very sincere and hearty invitation for them to visit Brighton next year. The Conference last visited Brighton in 1872, now thirty-two years since, and he was led to hope that the memory of that visit would remain with some of them, and to those who had not travelled so far south he might say that Brighton offered many attractions to the visitor. He then proceeded to enumerate the varied attractions of the town—the sea front, the clear atmosphere, an abundance of sunshine and ozone, and plenty of pure water. He also dilated on the splendid hotel accommodation of the town, mentioning particularly the Hôtel Métropole, which alone had accommodation for six hundred guests. He trusted that the headquarters of the Conference would be there, near to the beautiful West Pier, where, in case of one of their rare storms, the visitors would be able to take refuge and enjoy the fresh air without the usual attendant sea-sickness. He was present at the unanimous desire of all the chemists of Brighton and the district, and he could assure them that if they paid Brighton a visit they would have a very hearty reception, and that everything they could do would be done to make the visit a happy one.

Mr. Savage supported the invitation. He said the Conference had been to Dundee—noted for its cakes—and he asked them to come to Brighton—noted for its flowers and fruits. They had been to Belfast and to Glasgow—noted for whiskey; let them come to Brighton for the water to mix with it. It was the finest water in the south of England. Though their meeting would not be honoured by Royalty they would visit the abode that was once occupied by Royalty—one of the most beautiful and unique buildings in the world. They had at Brighton, among other things, an unfortunate aquarium, where

the collection of fish was the finest in England, and second only to the one at Naples, and where a biological school was being established.

Councillor YATES, in a humorous speech, said wherever the Conference went the question of the quality of the water was always made one of the greatest importance. He had interviewed the waterworks engineer, who informed him that they had a supply of eight million gallons a day, which he thought would be sufficient for all of them. As a member of the Aquarium Committee, he strongly objected to that institution being called unfortunate. It was going to be used by the London University for a local biological extension, and no doubt by next year it would be possible for the members of the Conference to attend the lectures.

Mr. BLAMEY also supported.

Mr. CURRIE proposed that the invitation to hold the meeting at Brighton in 1905 be accepted. They were assured of the best hotel accommodation that Great Britain could afford, and he did not think they could do better than accept the kind and courteous invitation in the spirit in which it was given.

Mr. W. GOWEN CROSS seconded. To adapt the words of the old verse, he had been to Brighton, and still would go, and he would recommend the members of the Conference to do the same.

Mr. BEGGS supported the resolution, which was carried unanimously.

FUTURE MEETING PLACES.

Mr. GERRARD said he formed one of a deputation from Birmingham and district and the Midland counties to ask the Conference to visit Birmingham in 1906. They would endeavour, as far as they possibly could, to outshine Brighton. He described the attractions of Birmingham at length, and pointed out the great contrast between the Black Country on the one side and the beautiful Forest of Arden on the other.

Mr. KEMP said his purpose had been obstructed by Birmingham. On behalf of the Manchester Association he had intended to ask the Conference to go to Manchester in 1906, but, as they were very friendly with Birmingham, and that city had preceded them in 1886, they would give way. They would ask the Conference to bear in mind that Manchester would give them an invitation for 1907.

Thanks to the Local Committee.

Mr. R. A. Robinson moved that the hearty thanks of the Conference be accorded to the members of the local Committee for the excellent arrangements so liberally made for the comfort and enjoyment of the members and visitors. He assured the members of the Local Committee that the Conference very much appreciated their great kindness and liberality. They had been most excellently entertained. He coupled with the resolution the names of Mr. Newsholme (Chairman), Mr. Squire (Treasurer), and Mr. Antcliffe (Hon. Secretary).

Mr. Tyrer, in seconding, said there was nothing to say but praise. There was no form of flattery like imitation, and the Society of Chemical Industry had copied the Pharmaceutical Conference in very many ways. The magnificent programme which the New York section of that Society had laid out was based upon the ideas which the Conference had so beautifully and delightfully embodied for so many years.

The resolution was carried amid applause.

Mr. Newsholme was the first to reply, and he thanked the Conference heartily for the vote. The work which the Local Committee had had to do for the Conference had been a great pleasure to them. He had been backed up by as loyal an Executive Committee as any man could possibly have. The whole of them had worked harmoniously together. A small committee, consisting of Messrs. Fox, Squire, Antcliffe and himself had had, perhaps, the greatest number of meetings to attend, and had done the greatest amount of work, but whatever they had done had always been backed up most handsomely by the whole of the Executive. The thanks of all were due more to the Local Honorary Secretary than to anybody else. During the whole of the time since the Conference was invited to visit Sheffield Mr. Antcliffe had worked exceedingly hard and in a splendid manner. Nothing had been too much for him to do. Mr. Antcliffe ought to have been there that afternoon, but he had got out of the response to the resolution. He was one of those men who delighted in work, and did not believe in too much talking. He was sure his friends on the Executive would bear him out when he said, "Let the whole of the praise be given to our Honorary Secretary."

Mr. Squire said there had been a great amount of work, but the result seemed to be appreciated, and that was the pleasure of the Local Committee. All the work they had done they had

been pleased to do. He hoped that Sheffield would be able to welcome the Conference once more in less than twenty-five years.

Councillor A. Russell Fox, who also replied, said he took to himself but a small part of the credit for the work that had been done to make the Conference meeting a success. Every member of the Committee had done his best to promote that object, and it was a great pleasure to hear expressions of satisfaction from so many of their visitors. He endorsed what Mr. Newsholme had said as to the great part of the work that had fallen upon Mr. Antcliffe's shoulders. Mr. Antcliffe had been at it morning, noon and night, and whatever meed of praise there was, should be given, not to the members of the Executive, but to him.

Election of Officers.

Mr. Martin proposed the election of the following officers for 1904–5 :—

President.—Mr. W. A. H. Naylor, F.I.C., F.C.S.

Vice-Presidents.—Mr. R. A. Robinson, Mr. Johnston Montgomery, Mr. D. B. Dott, Mr. W. H. Gibson, Professor Greenish, and Mr. F. Ransom.

Honorary Treasurer.—Mr. J. C. Umney.

Honorary Secretaries.—Mr. E. Saville Peck and Mr. Edmund White.

Honorary Local Secretary.—Mr. W. W. Savage.

Hon. Assistant Local Secretary.—Mr. C. G. Yates.

Other Members of the Executive Committee.—Messrs. H. Antcliffe, F. C. J. Bird, H. W. Gadd, D. Lloyd Howard, W. H. Martindale, H. E. Matthews, J. F. Tocher, Harold Wilson, and R. Wright.

Auditors.—Mr. J. W. Bowen and Mr. W. Prior Robinson.

Mr. Martin said at Dublin in 1901 they were plunged into grief at the knowledge that Mr. Naylor would resign his position as Senior Hon. Secretary, but he (the speaker) was told, in proposing a vote of thanks to him, to give the Conference the consolation that he would be a Vice-President. He also foreshadowed that before long Mr. Naylor would be President, and he now congratulated the Conference on the fact that he would be the President for next year. He need not tell them Mr. Naylor's qualifications for the office. They were written large in the *Year-Book*. For seventeen years he was Hon. Secretary ; for

eighteen years a member of the Formulary Committee; and for fifteen years the Hon. Secretary of that body. He had written about forty papers, all exceedingly interesting and valuable, and they would all look forward to hearing his presidential address, and to taking part in the Conference over which he would preside. They were greatly honoured that Mr. Robinson would become a Vice-President. It showed how close an interest the Pharmaceutical Society took in the welfare of the Conference. Mr. Johnston Montgomery was the other new Vice-President. The new members of the Executive were Mr. Tocher, who was especially well known in Scotland; Mr. D. Lloyd Howard, who bore an honoured name; Mr. Harold Wilson, who had done excellent service on the Formulary Committee and in other ways; and, not least, Dr. Harrison Martindale. It was very welcome to the Conference to have the name of Martindale restored. Those who had had the privilege of a long acquaintance with his distinguished father were glad to have the son there, and to listen to a paper which had stimulated their intellectual activities, and would keep them thinking for the next twelve months.

Mr. Glyn-Jones seconded the resolution, and congratulated the Conference on having so eminent a body of gentlemen at its disposal as officers.

The resolution was carried.

Closing Vote of Thanks.

Mr. Tocher proposed a vote of thanks to Dr. Hicks (Principal) and the Council of University College for the free use of the Lecture Theatre and the rooms attached for that meeting.

Mr. Watson Will seconded, and the resolution was carried unanimously.

Mr. Beggs, in moving a vote of thanks to the Lord Mayor of Sheffield, for his great kindness in welcoming the delegates and members of the Conference, said that the Conference was under a deep debt of gratitude to his Lordship, not only for his presence, but for the very brilliant reception and entertainment he had provided for them on Monday evening last in the Town Hall. He (Mr. Beggs) knew that each individual member would join with him in moving that the very best thanks of the Conference be given to the Lord Mayor for his very cordial welcome of the Conference.

This was seconded by Mr. FEAVER CLARKE and carried.

Dr. SYMES proposed a vote of thanks to the President for the able manner in which he had conducted the business of the meeting and the duties of his office during the year. It seemed a simple thing to be the figurehead of a Conference like that, but it certainly required a large amount of ability to master the whole of the papers, and much generalship to manage the discussions so that every one should have the largest amount of liberty of speech, and yet the work be kept within reasonable limits.

Mr. UMNEY, in seconding, said he believed Mr. Idris started pharmacy with his (the speaker's) father many years ago. The years had passed very lightly over his head, as they could see by his activity, not only in pharmacy, but in everything else that he handled.

The resolution was carried with heartiness.

The PRESIDENT, who was cordially received, thanked them very heartily for their kindness in supporting him, and in thanking him for having tried to do the work. The thanks were, however, given to the wrong man. The men, who had done the work, and who ought to be thanked, were the secretaries and the treasurer. The amount of work that they had done was not known to the Conference generally, but he assured them he could not have kept straight for half an hour without their assistance. He proposed a hearty vote of thanks to them.

Mr. NEWSHOLME seconded, and it was carried.

Mr. PECK, in reply, said the past year had been one of considerable anxiety to the executive and to the honorary general secretaries. He was certain that had he not had the able assistance of Mr. White he could have done nothing that he had done.

Mr. WHITE also briefly replied, and the proceedings then ended.

THE SOCIAL GATHERINGS.

THE RECEPTION.

On Monday evening, August 8, 1904, the members and their friends were the guests of the Lord Mayor and Lady Mayoress (Councillor and Mrs. J. R. Wheatley). The reception was held at the Town Hall, and was largely attended and much enjoyed.

The Lord Mayor's magnificent suite of rooms was thrown open, and about them moved a gay throng. In the parlour the guests were received ; the reception room, opening from it, was set apart for conversation, and there many old acquaintances were renewed ; and in the dining-room excellent programmes of music were presented. The Council Chamber, brightly decorated with flowers, was used as a refreshment-room and the comfort of the weed could be enjoyed in the Committee Rooms.

The Lord Mayor and Lady Mayoress were supported by Mr. and Mrs. Cecil Wheatley, Mr. J. R. Wheatley, jun., Mr. T. H. W. Idris (President of the Conference) and Mrs. Idris. There were about 300 guests.

An excellent musical programme, divided into three parts, and consisting of songs and duets, was rendered by Mr. T. Lally, Mr. J. A. Marsden, Miss Maud Johnston, and Miss Agnes Skidmore. Miss Skidmore also gave recitations. Mr. H. O. Ashmore was the accompanist.

In an interval after the first portion of the musical programme, the Lord Mayor said it was his very pleasing duty to give the Conference a cordial welcome to Sheffield. He did this with the greater pleasure from the fact that he was personally acquainted with a great many of the Sheffield members. It was twenty-five years since the Conference was last held in Sheffield, and those who were present on that occasion would notice that great changes had taken place in the city in the meantime. He was glad that they had arranged not only to visit some of the large works of the city, but also to take excursions into the surrounding country, which would give them an opportunity of seeing the very beautiful scenery that lay around Sheffield. One often heard people describe Sheffield as a dirty, miserable, wretched place, but that was because they had only seen the central business portion. In the immediate neighbourhood there was some of the most beautiful scenery in England. In conclusion, the Lord Mayor referred to the death of Mr. A. H. Allen, the city analyst, who was a prominent member of the Conference for some years, and whose recent loss would, he was sure, be regretted by them all.

Mr. Idris, in reply, acknowledged the cordiality and the hospitality of the Lord Mayor's welcome. In all gatherings of that kind there was a touch of sadness, and in alluding to the death of Mr. Allen the Lord Mayor had touched the feelings of every member of the Conference. They all joined in ex-

pressing their sympathy with those whom Mr. Allen had left behind. They were also reminded of Mr. William Ward, who twenty-five years ago was the Chairman of the Local Committee in Sheffield, and who had died since their last meeting. They desired to express their sympathy with his family.

Mr. NEWSHOLME, as President of the Local Committee, briefly acknowledged the welcome on behalf of the pharmacists of Sheffield.

The Reception was a great success, and the hospitality of the Lord Mayor was much appreciated.

VISITS TO WORKS.

During their stay in Sheffield, the members of the Conference and their lady friends took full advantage of opportunities of seeing typical Sheffield works. On Tuesday afternoon a large party was conducted over the establishment of Messrs. Walker and Hall, and on Wednesday the works of Messrs. Joseph Rodgers and Sons, Limited, and Messrs. Mappin and Webb were visited. The members of the Conference thus gained a large amount of information with regard to the cutlery and electro-plate industries. The processes connected with the heavy trades were also inspected a very enjoyable visit being paid to the works of Messrs. Cammell, Laird and Co., Limited, on Wednesday afternoon, at the conclusion of the business of the Conference. A party numbering about 250 persons were conveyed by special tramcars from Fitzalan Square to the West Forge Cyclops Works. They were there shown the rolling of a large armour-plate for H.M.S. *Africa*, the oil treatment of an armour-plate, the machine surfacing of plates, the 7,000 and 2,000 ton bending-presses at work, the large treating and heating furnaces for armour, the water treatment of a plate, the machine shops, where machining and finishing of work was in progress, the grinding machines, and one of the electric stations. The party were then conveyed in brakes to the Grimesthorpe steel works of the firm, where they saw steel-melting furnaces at work. The spring department was also visited, and here the party were shown all classes of railway material, including buffers and springs in course of manufacture, the testing of railway springs, and other processes.

The best thanks of the Conference are due to Messrs. Cammell, Laird and Co. for their generosity in providing vehicles for the

transport of the large party of visitors and skilled guides for explaining the processes seen in operation.

Another enjoyable item in connexion with the Conference was a drive for the ladies, who were taken on an excursion in the Redmires district on Wednesday morning.

Concerts and Dance.

The dance and smoking concert arranged by the Local Reception Committee, and held at the Royal Victoria Hotel on Tuesday evening, was a most enjoyable and in every way successful function. Nearly 250 members and ladies were present. The dance took place in the fine ballroom of the hotel, to the music of Mr. Needham's band, and was carried out with great spirit, the floor being in splendid condition.

The smoking concert was held in an adjoining room under the able direction of Mr. G. T. W. Newsholme. An interesting and attractive programme of vocal music by male voices was provided by the Sheffield Æolian Glee Singers, to whom the whole of the musical arrangements for the concert were entrusted. Besides part-songs, solos were rendered by the individual members of the glee party.

On Wednesday evening another smoking concert took place at the Royal Victoria Hotel, having been arranged by the Local Committee for the entertainment of the numerous members of the Conference staying in the hotel. Mr. Edward Evans, junior, presided, and a very pleasant evening was spent. The musical talent, of a high order, was provided by members of the Conference and their friends. There was, however, no formality, even a printed programme being dispensed with. At the close Mr. Evans was cordially thanked for his able and genial conduct in the chair.

The Excursion into Derbyshire.

Soon after 9 a.m. on Thursday, about 220 members of the Conference and their friends left the Royal Victoria Hotel in coaches and other carriages. The morning opened rather dull, and soon after starting a little rain fell. The weather continued threatening until Fox House was reached, where a short halt was made. For the rest of the day fine weather prevailed, and the

drive, continued by way of Froggatt Edge and Baslow to Chatsworth, through magnificent scenery, was thoroughly enjoyed by the whole party. After inspecting Chatsworth House the party returned to Baslow, where luncheon awaited them in a marquee erected in the grounds of the Peacock Hotel.

After luncheon Mr. G. T. W. Newsholme (president of the local committee) gave from the chair the loyal toast, and afterwards proposed "Success to the British Pharmaceutical Conference," which was responded to by Mr. W. A. H. Naylor, the new president. Mr. T. H. W. Idris, the retiring president, proposed "The Local Committee," and short replies were given by Messrs. H. Antcliffe, G. T. W. Newsholme, G. Squire, and Councillor A. R. Fox. The health of the ladies was drunk, on the call of Mr. W. F. Wells, and acknowledged by Mr. Turney.

The drive was then resumed through Chatsworth Park, by Rowsley, to Haddon Hall. Some time was spent in visiting this romantic baronial hall with its beautiful surroundings, and during the afternoon several photographs of the party were taken, the celebrated terrace forming a picturesque background. The party then re-embarked and the drive was continued through Bakewell, back to the Peacock Hotel at Baslow. A substantial tea was served in the marquee and about 8 o'clock the final stage of the day's excursion was entered upon. The return drive to Sheffield took the party over the moors *viâ* Owler Bar, and shortly before 10 o'clock the whole party was landed, safe and sound, in Sheffield. The outing was voted an unqualified success, and no mishap occurred to mar the day's enjoyment. For the excellent arrangements the Local Committee deserve the warmest praise, and they must have been gratified at the success of their efforts to pilot such a large party over hill and dale without a hitch.

The Luncheons.

Luncheon was served on Tuesday and Wednesday in the large Banqueting Hall of the Royal Victoria Hotel. The arrangements were excellent, and gave general satisfaction. At the close of the Conference proceedings on Tuesday and Wednesday afternoons, tea was served in the Montgomery Hall, nearly opposite the Town Hall. This was much appreciated by the

members, and provided a pleasant reunion between the business meetings of the Conference and the various functions arranged for the evenings.

Each visitor to the Sheffield Conference received a dainty little souvenir from the Local Committee in the shape of a tiny silver mortar and pestle. The mortar, which is intended to be used as a salt-cellar, is a miniature representation of an old seventeenth-century bell-metal mortar in the possession of Mr. John Austen, a member of the Local Committee. The pestle has been cunningly transformed into a salt-spoon. The mortar, the shape and exact size of which is shown in the figure below, bears the following engraved inscription: "B.P.C., Sheffield, 1904."

TABLES OF USEFUL INFORMATION FOR PHARMACISTS.

INDEX.

	PAGE
Alcohol Conversion Table	*facing* 593
Conversion of Grains into Grams	594
Conversion of Thermometric Scales	595, 596
English and French Equivalents of Weights and Monies	597, 598
Equivalent Rates per Lb. and Cwt.	599
Pharmacy and Poison Laws	599, 600
Postal Regulations	601-603
Profit Assessment	603, 604
Relation of Imperial to Metric Standards	604
Useful Data (General)	605, 606
Weights and Measures of Imperial System	606
Weights and Measures of Metric System	606

Table for Conversion of Grains into Grams.

Grns.	Grms.	Grns.	Grms.	Grns.	Grms.	Grns.	Grms.
1	·0648	54	3·4991	103	6·6743	152	9·8494
2	·1296	55	3·5639	104	6·7391	153	9·9142
3	·1944	56	3·6287	105	6·8039	154	9·9790
4	·3240	57	3·6935	106	6·8687	155	10·0438
6	·3888	58	3·7583	107	6·9335	156	10·1086
7	·4536	59	3·8231	108	6·9983	157	10·1734
8	·5184	60	3·8879	109	7·0631	158	10·2382
10	·6480	61	3·9527	110	7·1279	159	10·3030
11	·7128	62	4·0175	111	7·1927	160	10·3678
12	·7776	63	4·0823	112	7·2575	161	10·4326
13	·8424	64	4·1471	113	7·3223	162	10·4974
15	·9720	65	4·2119	114	7·3871	163	10·5622
16	1·0368	66	4·2767	115	7·4519	164	10·6270
17	1·1016	67	4·3415	116	7·5177	165	10·6918
18	1·1664	68	4·4063	117	7·5815	166	10·7566
20	1·2960	69	4·4711	118	7·6463	167	10·8214
21	1·3608	70	4·5359	119	7·7111	168	10·8862
22	1·4256	71	4·6007	120	7·7759	169	10·9510
23	1·4904	72	4·6655	121	7·8407	170	11·0158
24	1·5552	73	4·7303	122	7·9055	171	11·0806
25	1·6200	74	4·7951	123	7·9703	172	11·1454
26	1·6848	75	4·8599	124	8·0351	173	11·2102
27	1·7496	76	4·9247	125	8·0999	174	11·2750
28	1·8144	77	4·9895	126	8·1647	175	11·3398
29	1·8792	78	5·0543	127	8·2295	176	11·4046
30	1·9440	79	5·1191	128	8·2943	177	11·4694
31	2·0088	80	5·1839	129	8·3591	178	11·5342
32	2·0736	81	5·2487	130	8·4239	179	11·5990
33	2·1384	82	5·3135	131	8·4887	180	11·6638
34	2·2032	83	5·3783	132	8·5536	181	11·7286
35	2·2680	84	5·4431	133	8·6183	182	11·7934
36	2·3328	85	5·5079	134	8·6831	183	11·8582
37	2·3976	86	5·5727	135	8·7479	184	11·9230
38	2·4624	87	5·6375	136	8·8127	185	11·9878
39	2·5272	88	5·7023	137	8·8775	186	12·0526
40	2·5920	89	5·7671	138	8·9422	187	12·1174
41	2·6568	90	5·8319	139	9·0070	188	12·1822
42	2·7215	91	5·8967	140	9·0718	189	12·2470
43	2·7863	92	5·9615	141	9·1366	190	12·3118
44	2·8511	93	6·0263	142	9·2104	200	12·9598
45	2·9159	94	6·0911	143	9·2662	250	16·1997
46	2·9807	95	6·1559	144	9·3310	300	19·4397
47	3·0455	96	6·2207	145	9·3958	400	25·9196
48	3·1103	97	6·2855	146	9·4606	500	32·3995
49	3·1751	98	6·3503	147	9·5254	600	38·8794
50	3·2399	99	6·4151	148	9·5902	700	45·3593
51	3·3047	100	6·4799	149	9·6550	800	51·8392
52	3·3695	101	6·5447	150	9·7198	900	58·3190
53	3·4343	102	6·6095	151	9·7846	1000	64·7989

Conversion of Thermometric Scales.

Table I.

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
400	204·4	348	175·6	296	146·7	244	117·8
399	203·9	347	175·0	295	146·1	243	117·2
398	203·3	346	174·4	294	145·6	242	116·7
397	202·8	345	173·9	293	145·0	241	116·1
396	202·2	344	173·3	292	144·4	240	115·6
395	201·7	343	172·8	291	143·9	239	115·0
394	201·1	342	172·2	290	143·3	238	114·4
393	200·6	341	171·7	289	142·8	237	113·9
392	200·0	340	171·1	288	142·2	236	113·3
391	199·4	339	170·6	287	141·7	235	112·8
390	198·9	338	170·0	286	141·1	234	112·2
389	198·3	337	169·4	285	140·6	233	111·7
388	197·8	336	168·9	284	140·0	232	111·1
387	197·2	335	168·3	283	139·4	231	110·6
386	196·7	334	167·8	282	138·9	230	110·0
385	196·1	333	167·2	281	138·3	229	109·4
384	195·6	332	166·7	280	137·8	228	108·9
383	195·0	331	166·1	279	137·2	227	108·3
382	194·4	330	165·6	278	136·7	226	107·8
381	193·9	329	165·0	277	136·1	225	107·2
380	193·3	328	164·4	276	135·6	224	106·7
379	192·8	327	163·9	275	135·0	223	106·1
378	192·2	326	163·3	274	134·4	222	105·6
377	191·7	325	162·8	273	133·9	221	105·0
376	191·1	324	162·2	272	133·3	220	104·4
375	190·6	323	161·7	271	132·8	219	103·9
374	190·0	322	161·1	270	132·2	218	103·3
373	189·4	321	160·6	269	131·7	217	102·8
372	188·9	320	160·0	268	131·1	216	102·2
371	188·3	319	159·4	267	130·6	215	101·7
370	187·8	318	158·9	266	130·0	214	101·1
369	187·2	317	158·3	265	129·4	213	100·6
368	186·7	316	157·8	264	128·9	212	100·0
367	186·1	315	157·2	263	128·3	211	99·4
366	185·6	314	156·7	262	127·8	210	98·9
365	185·0	313	156·1	261	127·2	209	98·3
364	184·4	312	155·6	260	126·7	208	97·8
363	183·9	311	155·0	259	126·1	207	97·2
362	183·3	310	154·4	258	125·6	206	96·7
361	182·8	309	153·9	257	125·0	205	96·1
360	182·2	308	153·3	256	124·4	204	95·6
359	181·7	307	152·8	255	123·9	203	95·0
358	181·1	306	152·2	254	123·3	202	94·4
357	180·6	305	151·7	253	122·8	201	93·9
356	180·0	304	151·1	252	122·2	200	93·3
355	179·4	303	150·6	251	121·7	199	92·8
354	178·9	302	150·0	250	121·1	198	92·2
353	178·3	301	149·4	249	120·6	197	91·7
352	177·8	300	148·9	248	120·0	196	91·1
351	177·2	299	148·3	247	119·4	195	90·6
350	176·7	298	147·8	246	118·9	194	90·0
349	176·1	297	147·2	245	118·3	193	89·4

CONVERSION OF THERMOMETRIC SCALES (*continued*).

Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.
192	88·9	136	57·8	80	26·7	24	— 4·4
191	88·3	135	57·2	79	26·1	23	— 5·0
190	87·8	134	56·7	78	25·6	22	— 5·6
189	87·2	133	56·1	77	25·0	21	— 6·1
188	86·7	132	55·6	76	24·4	20	— 6·7
187	86·1	131	55·0	75	23·9	19	— 7·2
186	85·6	130	54·4	74	23·3	18	— 7·8
185	85·0	129	53·9	73	22·8	17	— 8·3
184	84·4	128	53·3	72	22·2	16	— 8·9
183	83·9	127	52·8	71	21·7	15	— 9·5
182	83·3	126	52·2	70	21·1	14	—10·0
181	82·8	125	51·7	69	20·6	13	—10·6
180	82·2	124	51·1	68	20·0	12	—11·1
179	81·7	123	50·6	67	19·4	11	—11·7
178	81·1	122	50·0	66	18·9	10	—12·2
177	80·6	121	49·4	65	18·3	9	—12·8
176	80·0	120	48·9	64	17·8	8	—13·3
175	79·4	119	48·3	63	17·2	7	—13·9
174	78·9	118	47·8	62	16·7	6	—14·4
173	78·3	117	47·2	61	16·1	5	—15·0
172	77·8	116	46·7	60	15·6	4	—15·6
171	77·2	115	46·1	59	15·0	3	—16·1
170	76·7	114	45·6	58	14·4	2	—16·7
169	76·1	113	45·0	57	13·9	1	—17·2
168	75·6	112	44·4	56	13·3	0	—17·8
167	75·0	111	43·9	55	12·8	— 1	—18·3
166	74·4	110	43·3	54	12·2	— 2	—18·9
165	73·9	109	42·8	53	11·7	— 3	—19·4
164	73·3	108	42·2	52	11·1	— 4	—20·0
163	72·8	107	41·7	51	10·6	— 5	—20·6
162	72·2	106	41·1	50	10·0	— 6	—21·1
161	71·7	105	40·6	49	9·4	— 7	—21·7
160	71·1	104	40·0	48	8·9	— 8	—22·2
159	70·6	103	39·4	47	8·3	— 9	—22·8
158	70·0	102	38·9	46	7·8	—10	—23·3
157	69·4	101	38·3	45	7·2	—11	—23·9
156	68·9	100	37·8	44	6·7	—12	—24·4
155	68·3	99	37·2	43	6·1	—13	—25·0
154	67·8	98	36·7	42	5·6	—14	—25·6
153	67·2	97	36·1	41	5·0	—15	—26·1
152	66·7	96	35·6	40	4·4	—16	—26·7
151	66·1	95	35·0	39	3·9	—17	—27·2
150	65·6	94	34·4	38	3·3	—18	—27·8
149	65·0	93	33·9	37	2·8	—19	—28·3
148	64·4	92	33·3	36	2·2	—20	—28·9
147	63·9	91	32·8	35	1·7	—21	—29·4
146	63·3	90	32·2	34	1·1	—22	—30·0
145	62·8	89	31·7	33	0·6	—23	—30·6
144	62·2	88	31·1	32	0·0	—24	—31·1
143	61·7	87	30·6	31	—0·6	—25	—31·7
142	61·1	86	30·0	30	—1·1	—26	—32·2
141	60·6	85	29·4	29	—1·7	—27	—32·8
140	60·0	84	28·9	28	—2·2	—28	—33·3
139	59·4	83	28·3	27	—2·8	—29	—33·9
138	58·9	82	27·8	26	—3·3	—30	—34·4
137	58·3	81	27·2	25	—3·9	—31	—35·0

Table Showing the Value of 1 lb. and 1 cwt. in English Money when the Article is Quoted per Kilo in Francs.

If 1 kilo costs		1 lb. will cost			1 cwt. will cost			If 1 kilo costs		1 lb. will cost			1 cwt. will cost		
Fr.	cts.	£	s.	d.	£	s.	d.	Fr.	cts.	£	s.	d.	£	s.	d.
–	5	–	–	–¼	–	2	0½	2	50	–	–	10⅞	5	1	7¼
–	10	–	–	–½	–	4	0¾	2	55	–	–	11⅛	5	3	7¾
–	15	–	–	–⅝	–	6	1¼	2	60	–	–	11⅜	5	5	8
–	20	–	–	–⅞	–	8	1½	2	65	–	–	11½	5	7	8½
–	25	–	–	1⅛	–	10	2	2	70	–	–	11¾	5	9	8¾
–	30	–	–	1⅜	–	12	2½	2	75	–	1	0	5	11	9
–	35	–	–	1½	–	14	2¾	2	80	–	1	0¼	5	13	9½
–	40	–	–	1¾	–	16	3	2	85	–	1	0⅜	5	15	9¾
–	45	–	–	2	–	18	3¼	2	90	–	1	0⅜	5	17	10¼
–	50	–	–	2¼	1	0	3½	2	95	–	1	0⅞	5	19	10¾
–	55	–	–	2⅜	1	2	4¼	3	0	–	1	1⅛	6	1	11¼
–	60	–	–	2⅝	1	4	4½	3	5	–	1	1¼	6	3	11½
–	65	–	–	2⅞	1	6	5	3	10	–	1	1½	6	5	11¾
–	70	–	–	3⅛	1	8	5	3	15	–	1	1¾	6	8	0¼
–	75	–	–	3¼	1	10	5¾	3	20	–	1	1⅞	6	10	0¾
–	80	–	–	3½	1	12	6¼	3	25	–	1	2⅛	6	12	1
–	85	–	–	3¾	1	14	6½	3	30	–	1	2⅜	6	14	1½
–	90	–	–	3⅞	1	16	7	3	35	–	1	2⅝	6	16	1¾
–	95	–	–	4⅛	1	18	7¼	3	40	–	1	2¾	6	18	2¼
1	0	–	–	4⅜	2	0	7¼	3	45	–	1	3	7	0	2¾
1	5	–	–	4⅝	2	2	8¼	3	50	–	1	3¼	7	2	3
1	10	–	–	4¾	2	4	8½	3	55	–	1	3½	7	4	3¼
1	15	–	–	5	2	6	8¾	3	60	–	1	3⅝	7	6	3½
1	20	–	–	5¼	2	8	9	3	65	–	1	3⅞	7	8	4
1	25	–	–	5½	2	10	9½	3	70	–	1	4⅛	7	10	4½
1	30	–	–	5⅝	2	12	10	3	75	–	1	4⅜	7	12	4¾
1	35	–	–	5⅞	2	14	10¼	3	80	–	1	4½	7	14	5¼
1	40	–	–	6⅛	2	16	10¾	3	85	–	1	4¾	7	16	5½
1	45	–	–	6⅜	2	18	11	3	90	–	1	5	7	18	6
1	50	–	–	6½	3	0	11½	3	95	–	1	5¼	8	0	6½
1	55	–	–	6¾	3	3	0	4	0	–	1	5⅜	8	2	7
1	60	–	–	7	3	5	0¼	4	5	–	1	5⅝	8	4	7½
1	65	–	–	7¼	3	7	0¾	4	10	–	1	5⅞	8	6	7¾
1	70	–	–	7⅜	3	9	1	4	15	–	1	6⅛	8	8	8
1	75	–	–	7⅝	3	11	1½	4	20	–	1	6¼	8	10	8½
1	80	–	–	7⅞	3	13	2	4	25	–	1	6½	8	12	8¾
1	85	–	–	8⅛	3	15	2¼	4	30	–	1	6¾	8	14	9
1	90	–	–	8¼	3	17	2¾	4	35	–	1	6⅞	8	16	9½
1	95	–	–	8½	3	19	3	4	40	–	1	7⅛	8	18	9¾
2	0	–	–	8¾	4	1	3¼	4	45	–	1	7⅜	9	0	10¼
2	5	–	–	8⅞	4	3	3¾	4	50	–	1	7⅝	9	2	10½
2	10	–	–	9⅛	4	5	4	4	55	–	1	7¾	9	4	11
2	15	–	–	9⅜	4	7	4¼	4	60	–	1	8	9	6	11½
2	20	–	–	9⅝	4	9	4¾	4	65	–	1	8¼	9	8	11¾
2	25	–	–	9¾	4	11	5¼	4	70	–	1	8⅜	9	11	0¼
2	30	–	–	10	4	13	5¾	4	75	–	1	8⅝	9	13	0½
2	35	–	–	10¼	4	15	6	4	80	–	1	8⅞	9	15	1
2	40	–	–	10½	4	17	6½	4	85	–	1	9⅛	9	17	1½
2	45	–	–	10⅝	4	19	7	4	90	–	1	9⅜	9	19	1¾

TABLE SHOWING THE VALUE OF 1 LB. AND 1 CWT. IN ENGLISH MONEY WHEN THE ARTICLE IS QUOTED PER KILO IN FRANCS (*continued*).

If 1 kilo costs		1 lb. will cost			1 cwt. will cost			If 1 kilo costs		1 lb. will cost			1 cwt. will cost		
Fr.	cts.	£	s.	d.	£	s.	d.	Fr.	cts.	£	s.	d.	£	s.	d.
4	95	–	1	9½	10	1	2¼	8	80	–	3	2¼	17	17	7¾
5	0	–	1	9¾	10	3	2½	8	90	–	3	2¾	18	1	8½
5	10	–	1	10¼	10	7	3¼	9	0	–	3	3⅛	18	5	9
5	20	–	1	10⅝	10	11	4	9	10	–	3	3⅝	18	9	10¾
5	30	–	1	11⅛	10	15	4¾	9	20	–	3	4	18	13	10¾
5	40	–	1	11½	10	19	5½	9	30	–	3	4½	18	17	11½
5	50	–	1	11⅞	11	3	6¼	9	40	–	3	4⅞	19	2	0½
5	60	–	2	0⅜	11	7	7¼	9	50	–	3	5⅜	19	6	1¼
5	70	–	2	0¾	11	11	8	9	60	–	3	5¾	19	10	2
5	80	–	2	1¼	11	15	8¾	9	70	–	3	6¼	19	14	2¾
5	90	–	2	1⅝	11	19	9¼	9	80	–	3	6⅝	19	18	3¼
6	0	–	2	2⅛	12	3	10¼	9	90	–	3	7⅛	20	2	4¼
6	10	–	2	2½	12	7	11	10	–	–	3	7½	20	6	5
6	20	–	2	3	12	11	11¾	11	–	–	3	11⅞	22	7	0¾
6	30	–	2	3⅜	12	16	0½	12	–	–	4	4¼	24	7	8½
6	40	–	2	3⅞	13	0	1¼	13	–	–	4	8⅝	26	8	4
6	50	–	2	4¼	13	4	2½	14	–	–	5	1	28	9	0
6	60	–	2	4¾	13	8	2¾	15	–	–	5	5¼	30	9	7½
6	70	–	2	5⅛	13	12	3½	16	–	–	5	9⅝	32	10	3¼
6	80	–	2	5⅝	13	16	4¼	17	–	–	6	2	34	10	11
6	90	–	2	6	14	0	5	18	–	–	6	6⅜	36	11	6½
7	0	–	2	6½	14	4	6	19	–	–	6	10¾	38	12	2¼
7	10	–	2	6⅞	14	8	6¾	20	–	–	7	3	40	12	10
7	20	–	2	7⅜	14	12	7½	30	–	–	10	10⅝	60	19	3
7	30	–	2	7¾	14	16	8¼	40	–	–	14	6⅛	81	5	8
7	40	–	2	8¼	15	0	9	50	–	–	18	1⅝	101	12	1
7	50	–	2	8⅝	15	4	9¾	60	–	1	1	9¼	121	18	6
7	60	–	2	9⅛	15	8	10½	70	–	1	5	4¾	142	4	11
7	70	–	2	9½	15	12	11¼	80	–	1	9	0⅜	162	11	4
7	80	–	2	9⅞	15	17	0¼	90	–	1	12	7⅞	182	17	9
7	90	–	2	10⅜	16	1	0¾	100	–	1	16	3½	203	4	2
8	0	–	2	10¾	16	5	1¾	200	–	3	12	7	406	8	4
8	10	–	2	11¼	16	9	2½	300	–	5	8	10¼	609	12	7
8	20	–	2	11⅜	16	13	3	400	–	7	5	1¾	812	16	9
8	30	–	3	0⅛	16	17	3¾	500	–	9	1	5¼	1016	0	11
8	40	–	3	0½	17	1	4¾	600	–	10	17	8¾	1219	5	2
8	50	–	3	1	17	5	5½	700	–	12	14	0	1422	9	4
8	60	–	3	1⅜	17	9	6¼	1000	–	18	2	10½	2032	1	11
8	70	–	3	1⅞	17	13	7								

Table showing Equivalent Rates per Lb. and Cwt.

Per lb.	Per cwt.	Per lb.	Per cwt.	Per lb.	Per cwt.
d.	s. d.	d.	s. d.	d.	s. d.
$\frac{1}{4}$	2 4	$4\frac{1}{4}$	39 8	$8\frac{1}{4}$	77 0
$\frac{1}{2}$	4 8	$4\frac{1}{2}$	42 0	$8\frac{1}{2}$	79 4
$\frac{3}{4}$	7 0	$4\frac{3}{4}$	44 4	$8\frac{3}{4}$	81 8
1	9 4	5	46 8	9	84 0
$1\frac{1}{4}$	11 8	$5\frac{1}{4}$	49 0	$9\frac{1}{4}$	86 4
$1\frac{1}{2}$	14 0	$5\frac{1}{2}$	51 4	$9\frac{1}{2}$	88 8
$1\frac{3}{4}$	16 4	$5\frac{3}{4}$	53 8	$9\frac{3}{4}$	91 0
2	18 8	6	56 0	10	93 4
$2\frac{1}{4}$	21 0	$6\frac{1}{4}$	58 4	$10\frac{1}{4}$	95 8
$2\frac{1}{2}$	23 4	$6\frac{1}{2}$	60 8	$10\frac{1}{2}$	98 0
$2\frac{3}{4}$	25 8	$6\frac{3}{4}$	63 0	$10\frac{3}{4}$	100 4
3	28 0	7	65 4	11	102 8
$3\frac{1}{4}$	30 4	$7\frac{1}{4}$	67 8	$11\frac{1}{4}$	105 0
$3\frac{1}{2}$	32 8	$7\frac{1}{2}$	70 0	$11\frac{1}{2}$	107 4
$3\frac{3}{4}$	35 0	$7\frac{3}{4}$	72 4	$11\frac{3}{4}$	109 8
4	37 4	8	74 8	12	112 0

Pharmacy and Poison Laws of Great Britain and Ireland.

GREAT BRITAIN.

The Arsenic Act, 1851, recites conditions for the sale of white arsenic.

The Pharmacy Act, 1852, gave the Pharmaceutical Society of Great Britain power to hold examinations and grant title of pharmaceutical chemist.

The Pharmacy Act, 1868, comprises regulations for the sale of poisons and registration of retailers and dispensers of same.

The Pharmacy Act, 1869, amends provisions of 1868 Act in the case of medical practitioners and veterinary surgeons.

The Pharmacy Act, 1898, enables chemists and druggists to become members of the Pharmaceutical Society.

Schedule of Poisons.
Part 1.

The poisons named in this part may not be sold by retail unless:

(1) The purchaser be known to the seller, or be introduced by a person known to the seller also.

(2) Each sale be entered in the poison book as follows: (*a*) date of sale; (*b*) name and address of purchaser; (*c*) name and quantity of poison sold;

IRELAND.

The Arsenic Act, 1851.

Sale of Poisons Act (Ireland), 1870, relates to the sale of poisons and adulteration.

Pharmacy Act (Ireland), 1875, creates the Pharmaceutical Society of Ireland, and provides for registration of dispensers and retailers of poisons.

Pharmacy Act (Ireland), 1875, Amendment Act, 1890, creates registered druggists.

Statute-Law Revision (No. 2) Act, 1893, repeals a few minor enactments of the Acts 1870 and 1875.

Schedule of Poisons.
Part 1.

Same as in Great Britain.

GREAT BRITAIN.	IRELAND.
SCHEDULE OF POISONS (*continued*).	
(*d*) purpose for which it is stated to be required; (*e*) signature of the purchaser, and introducer, if any (Arsenic, *vide* p. 617). (3) The poison sold must be labelled with (*f*) the name of the article; (*g*) the word "Poison"; (*h*) the name and address of the seller.	
Aconite and its preparations. Arsenic and its preparations. Atropine and its preparations. Cantharides. Corrosive sublimate. Cyanide of potassium and all metallic cyanides. Emetic tartar. Ergot of rye and its preparations. Prussic acid. Savin and its oil. Strychnine. All poisonous vegetable alkaloids and their salts.	Same as in Great Britain
PART 2.	PART 2.
The poisons named in this part may not be sold by retail unless labelled with (*a*) the name of the article; (*b*) the word "poison"; (*c*) the name and address of the seller.	Same as in Great Britain.
Ammoniated mercury (commonly known as white precipitate of mercury). Belladonna and its preparations. Cantharides, tincture and all vesicating liquid preparations of. Liquid preparations of carbolic acid and its homologues containing more than 3 per cent. of those substances, except any preparation used as a sheepwash or for any other purpose in connection with agriculture or horticulture. Chloral hydrate and its preparations. Chloroform. Corrosive sublimate, preparations of. Essential oil of almonds, unless deprived of its prussic acid. Morphine, preparations of. Nux vomica and its preparations. Opium and all preparations of opium or of poppies. Oxalic acid. Phenol and its homologues (liquid preparations containing more than 3 per cent.). Red oxide of mercury (commonly known as red precipitate of mercury). Vermin-killers, *i.e.*, "every compound containing any poison within the meaning of the Pharmacy Act, 1868, when prepared or sold for the destruction of vermin."	Same as in Great Britain, with the following additions. Sulphuric ether. Phosphorus, and all preparations containing it in a free state. Preparations of strychnine. Biniodide of mercury.

POSTAL REGULATIONS.

PRINCIPAL POST-OFFICE CHARGES.

Letter Post.

Inland.—Not exceeding 4 oz. . . . . 1*d.*
For every additional 2 oz. . . . . ½*d.*
Postcard . . . . . ½*d.*

Colonial and Foreign.—To undermentioned British Possessions and Protectorates, viz.: Aden, Ascension, Bahamas, Barbados, Bermudas, British Central Africa, British East Africa, British Guiana, British Honduras, British North Borneo, Canada, Cape Colony, Cayman Islands, Ceylon, China (places at which British post offices are maintained), Cyprus, Falkland Islands, Fiji, Gambia, Gibraltar, Gold Coast, Hong Kong India, Jamaica, Johore, Labuan, Lagos, Leeward Islands (viz., Antigua St. Kitts, Nevis, Dominica, Montserrat, and the Virgin Islands), Malay States (Protected, viz., Perak, Selangor, Negri-Sembilan, and Pahang), Malta, Mauritius, Natal, Newfoundland, New Zealand, Niger Coast Protectorate, Niger Territory, St. Helena, Sarawak, Seychelles, Sierra Leone, Somaliland, Straits Settlements, Tobago, Transvaal, Trinidad, Turk's Islands, Uganda, Windward Islands (viz., Grenada, St. Lucia, St. Vincent, and the Grenadines), and Zanzibar.

Per ½ oz. . . . . 1*d.*
Elsewhere per ½ oz. . . . . 2½*d.*
Postcard . . . . . 1*d.*

Book Post.

Inland.—Not exceeding 2 oz. . . . . ½*d.*
For every additional 2 oz. . . . . ½*d.*
Colonial and Foreign.—Per 2 oz. . . . . ½*d.*

Parcel Post.

Inland.—Not exceeding 1 lb. . . . . 3*d.*
And 1*d.* for each additional 1 lb. up to 11 lbs., which is the maximum.

Newspaper Post.

Inland.—Each registered newspaper . . . . ½*d.*
Colonial and Foreign as book post.

Telegrams.

Inland.—For first twelve words . . . . . 6*d.*
For each additional word . . . . . ½*d.*

Postal Orders.

The orders are issued for the following amounts, upon which poundage is charged as follows :—

Amount.	*Poundage.*
6*d.*, 1*s.*, 1*s.* 6*d.*	each, ½*d.*
2*s.*, 2*s.* 6*d.*, 3*s.*, 3*s.* 6*d.*, 4*s.*, 4*s.* 6*d.*, 5*s.*, 5*s.* 6*d.*, 6*s.*, 6*s.* 6*d.*, 7*s.*, 7*s.* 6*d.*, 8*s.*, 8*s.* 6*d.*, 9*s.*, 9*s.* 6*d.*; 10*s.*, 10*s.* 6*d.*	each, 1*d.*
11*s.*, 11*s.* 6*d.*, 12*s.*, 12*s.* 6*d.*, 13*s.*, 13*s.* 6*d.*, 14*s.*, 14*s.* 6*d.*, 15*s.*, 15*s.* 6*d.*, 16*s.*, and 20*s.*	each, 1½*d.*

Postal orders for other amounts between 16*s.* 6*d.* and 21*s.* will be introduced during the current year.

Inland Money Orders.

For sums not exceeding £1	2*d.*
„ exceeding £1 and not exceeding £3	3*d.*
„ „ £3 „ „ £10	4*d.*

Money Orders for Places Abroad.

For sums not exceeding £2	6*d.*
„ exceeding £2 and not exceeding £6	1*s.*
„ „ £6 „ „ £10	1*s.* 6*d.*

Registration.

Letters, parcels, and postal packets are registered at 2*d.* to 1*s.* 2*d.* each, the compensation ranging from £5 to £120. Coins, watches, or jewellery must be registered. The letters or packets must be marked "Registered," and handed over the counter at a post office. The special post office envelopes should be used when possible.

Newspapers and Books.

The postal rate on newspapers is ½*d.* each. A packet must not exceed 5 lbs. in weight or 2 feet in length or 1 foot in width or depth. Newspaper wrappers bearing ½*d.* or 1*d.* stamps are obtainable at 4*d.* for seven or 8½*d.* for eight.

Books, if sent by book-post, must be posted either without wrapper, or in an unsealed envelope or cover so as to be easy of inspection. Size of the packet allowed is the same as for newspapers.

Commercial papers such as invoices, orders for goods, advice notes, waybills, bills of lading, receipts, statements of account, prices current, market reports, etc., are accepted for transmission at the book packet rate, conditionally upon nothing appearing in writing on the documents save dates, the names and addresses of the parties, the particulars and prices of any goods, or the particulars of any sums of money to which the document relates, and the mode of consignment of any such goods or money. Matter in the nature of a letter must be wholly in print, and must relate exclusively to the subject-matter of the document.

Circulars are also received at the book rate.

Parcels.

Limitations.—The size for an inland parcel is—

Greatest length, 3½ feet; greatest length and girth combined, 6 feet.

The maximum weight allowed for an inland parcel is 11 lbs.

Parcels to or from the Channel Islands or the Isle of Man and the United Kingdom are liable to Customs duty on delivery if they contain anything dutiable.

Compensation up to £2 is allowed for parcels lost or damaged though not registered, under certain conditions, *but not for fragile or perishable articles.*

Colonial and Foreign Service.

Book Post.—The articles permitted to be sent at the book post rate are printed and commercial papers similar in nature to those already described. The lowest charge for books is ½*d.*, and for commercial papers, 2½*d.*, and up to 10 oz. may be sent for the latter sum. Packets addressed to British Colonies or Possessions and non-Union countries must not exceed 2 feet long and 1 foot wide or deep, and 5 lbs. in weight. To Foreign Countries in the Postal Union the length is limited to 18 inches, and the weight to 4 lbs. A roll may be 30 inches long and 4 inches in diameter. The packets must be open for inspection.

Patterns and Samples.—Rate, 1*d.* the first 4 oz., ½*d.* for every additional 2 oz. The samples must be *bonâ fide* trade patterns or samples of merchandise, so packed as to give freedom of inspection. The limit of weight for British Colonies or Possessions or for non-Union countries is 5 lbs., and of dimensions 2 feet by 1 foot by 1 foot.

Parcels conveyed to colonial and foreign parts through the Post Office are subject to the Customs regulations of the country to which they are addressed. Declarations have to be made by the sender *on forms obtainable from the Post Office.* Generally an invoice may be enclosed in the parcel, but not a letter.

Profit Assessment.

The following examples show how the questions of profits and percentages upon cost and sales can be calculated. The cost and profit figures may be taken as either pounds, shillings, pence, or farthings.

1. To find the percentage of profit on cost—

Say the cost is 8 and the profit 4.

$4 \times 100 = 400 \div 8 = 50$ per cent.

2. To find the percentage of profit on sales—

Taking the same figures for cost and profit.

$4 \times 100 = 400 \div 12\ (4+8) = 33$ per cent.

3. To find what amount to add to cost to realize a certain rate per cent. upon the cost—

Say the cost is 6 and the rate required 25 per cent.

$6 \times 25 = 150 \div 100 = 1{\cdot}5$;

which may be £1 10*s.*, 1*s.* 6*d.*, or 1½*d.*

4. To find what amount to add to cost to produce a certain rate per cent. upon sales—

Say the cost is 6 and the rate 25.

$6 \times 25 = 150 \div 75\ (100-25) = 2.$

A Handy Table for Assessing Profits.

By adding to the cost, as follows, the relative percentages of profit are obtained :—

One half	50	per cent.	on cost, and	33	per cent.	on sales.
„ third	33·33	„	„	25	„	„
„ fourth	25	„	„	20	„	„
„ fifth	20	„	„	16·6	„	„
„ sixth	16·6	„	„	14·28	„	„
„ seventh	14·28	„	„	12·5	„	„
„ eighth	12·5	„	„	11·11	„	„
„ ninth	11·11	„	„	10	„	„
„ tenth	10	„	„	9·09	„	„
„ eleventh	9·09	„	„	8·33	„	„
„ twelfth	8·33	„	„	7·69	„	„
„ thirteenth	7·69	„	„	7·14	„	„
„ fourteenth	7·14	„	„	6·66	„	„
„ fifteenth	6·66	„	„	6·25	„	„
„ sixteenth	6·25	„	„	5·88	„	„
„ seventeenth	5·88	„	„	5·55	„	„
„ eighteenth	5·55	„	„	5·26	„	„
„ nineteenth	5·26	„	„	5	„	„
„ twentieth	5	„	„	4·76	„	„

Relation of the Imperial to the Metric Standards.

Standards of Mass.

1 Pound=453·59243 grammes.
1 Ounce=28·34953 grammes, or 28·35 grm. nearly.
1 Grain=0·064798918 gramme, or 0·0648 grm. „

Standards of Capacity.

1 Gallon=4·5459631 litres.
1 Pint=0·5682454 litre, or 568·336 cubic centimetres nearly.
1 Fluid Ounce=0·0284123 litre, or 28·417 cubic centimetres nearly.
1 Fluid Drachm=0·003552 litre, or 3·552 cubic centimetres „
1 Minim=0·000059 litre, or 0·059 cubic centimetre nearly.

Standards of Length.

1 Yard=0·914399 metre.
1 Foot=0·30480 metre=30·48 centimetres.
1 Inch=0·02540 metre=25·40 millimetres.

Various Useful Data.

To reduce specific gravity with regard to air, to specific gravity with regard to hydrogen, multiply by 14·438.

To reduce specific gravity with regard to hydrogen, to specific gravity compared to air, multiply by ·06926.

To reduce weight in air to weight in vacuo:

P = weight required in vacuo.
q = weight in air.
V = volume of body weighed.
v = volume of the weights.
s = specific gravity of air (weight of one cubic unit).

$$P = q \times s\ (V - v).$$

To find the circumference of a circle:

a = circumference. r = diameter.
n = 3·1415926. a = n r.

To find contents of a sphere = c:

$c = d^3 \times ·5236$. d = diameter.

To find contents of a cylinder = c:

c = area of base, × height.

To find the contents of a rectangular vessel = c:

a = length. h = height.
b = breadth. $c = a \times b \times h$.

To convert the degrees of Twaddle's hydrometer into specific gravity, multiply by 5, and add 1000; this gives the specific gravity with reference to water as 1000.

To convert lbs. per square inch into kilograms per square centimetre, multiply by ·0703.

To convert kilograms per square centimetre into lbs. per square inch, multiply by 14·2247.

To reduce inches to metres, multiply by ·02540.

To reduce inches to centimetres, multiply by 2·540.

To reduce centimetres to inches, multiply by ·3937.

To reduce kilograms to pounds, multiply by 2·2046.

To reduce litres to gallons, multiply by ·22.

To reduce gallons to litres, multiply by 4·548.

To reduce pints to cubic centimetres, multiply by 567·936.

To reduce grams to grains, multiply by 15·432.

To reduce grains to grams, multiply by ·0648.

To reduce ounces to grams, multiply by 28·349.

The following data are useful in calculations relating to air:

To find the quantity of nitrogen by volume corresponding to 1 volume of oxygen, multiply by 3·770992.

To find the quantity of oxygen by volume corresponding to 1 volume of nitrogen, multiply by ·265182.

To find the quantity of nitrogen by weight corresponding to 1 part by weight of oxygen, multiply by 3·313022.

To find the quantity of oxygen by weight corresponding to 1 part by weight of nitrogen, multiply by ·301839.

To find the quantity of nitrogen by volume corresponding to 1 part by weight of oxygen, multiply by 2·6365411.

To find the quantity of oxygen by volume corresponding to 1 part by weight of nitrogen, multiply by ·2730071.

To find the quantity of nitrogen by weight corresponding to 1 part by volume of oxygen, multiply by 3·6629154.

To find the quantity of oxygen by weight corresponding to 1 part by volume of nitrogen, multiply by ·3792848.

Weights and Measures of Imperial System.

Measures of Mass.

1 grain	gr.	
1 ounce (avoir.)	oz.	=437·5 grains.
1 pound	lb.	=16 ounces= 7000 „

Measures of Capacity.

1 minim	min.	
1 fluid drachm	fl. drm.	=60 minims.
1 fluid ounce	fl. oz.	= 8 fluid drachms.
1 pint	O	=20 fluid ounces.
1 gallon	C	= 8 pints.

Measures of Length.

1 inch	in.	
1 foot	ft.	=12 inches.
1 yard	yd.	=36 „

Relation of Volume to Mass.

1 minim	is the volume at 62°F. of		0·9114583	grain of water.
1 fluid drachm	„	„	54·6875	grains „
1 fluid ounce	„	1 ounce or	437·5	„ „
1 pint	„	1·25 pounds or	8750·0	„ „
1 gallon	„	10 pounds or	70000·0	„ „
109·7143 minims[1]	=the volume at 62°F. of		100	„ „

Weights and Measures of Metric System.

Measures of Mass.

1 milligramme=the thousandth part of one grm. or 0·001 grm.
1 centigramme=the hundredth part of one grm. or 0·01 grm.
1 decigramme =the tenth part of one grm. or 0·1 grm.
1 gramme =weight of one millilitre of distilled water at 4°C. (39·2°F.) or 1·0 grm.
1 dekagramme=ten grammes or 10·0 grm.
1 hectogramme=one hundred grammes or 100·0 grm.
1 kilogramme =one thousand grammes or 1000·0 grm.

[1] Taken as 110 minims throughout the Pharmacopœia.

Measures of Capacity.

1 millilitre=the volume at 4°C. of 1 grm. of water.
1 centilitre= „ „ of 10 „
1 decilitre = „ „ of 100 „
1 litre = „ „ of 1000 grm. (1 kilog.).

Measures of Length.

1 millimetre=one thousandth part of one metre or 0·001 metre.
1 centimetre=one hundredth „ „ or 0·01 „
1 decimetre =one tenth „ „ or 0·1 „
1 metre 1·0 „

Relation of Cubic Measures to Measures of Capacity.

1 cubic centimetre=0·99984 millilitre.
1 cubic decimetre =0·99984 litre, or 1000 cub. centim.

1·00016 cubic centimetres=1 millilitre.
1·00016 cubic decimetres =1 litre, or 1000 millilitres.

INDEX

A.

Abies pectinata, Lauric Aldehyde in Oil of, 15.
Abrastol, Colour Reactions for, 15.
Acacia cavenia, Essential Oil of, 15.
Acacia farnesiana, Essential oil of, 16.
Acetanilide and Phenacetin, Distinctive Reactions for, 16.
Acetic Acid and Vinegar, Detection and Determination of Mineral Acid in, 16.
Acetic Acid as Menstruum for Fluid Extracts, 274.
Acetic Acid, Lead in, 110.
Acetone Chloroform, 187.
Acetone in Urine, Detection of, 177.
Acetone Solution of Coal Tar, 276.
Acetozone, 187.
Acetyl Chloride as a Digestive Stimulant, 188.
Acid, Acetic, and Vinegar, Detection and Determination of Mineral Acid in, 16.
Acid Acetic, as Menstruum for Fluid Extracts, 274.
Acid Acetic, Lead in, 110.
Acid Angelic, in Chamomile Oil, 47.
Acid Bismutho-proto-catechuic, 41.
Acid Boric, Glycerin of, 280.
Acid Boric, in Cider and Fruits, Determination of, 483.
Acid Carbolic, Syrup, 276.
Acid Chaulmoogric, 49.
Acid Citric, and Tartaric, and Salts, Detection of Metallic Contamination in, 60.
Acid Citric, to Prevent Precipitation of Certain Tinctures, 267.
Acid, Cyclogallipharic, 75.
Acid Formic, Action of, on the Muscular System (Clément), (Garrigue), 213.
Acid Formic, to Separate Iron from Aluminium, 92.
Acid Globularic, 94.
Acid Hydriodic, as a Microscopical Reagent for Blood, 316.
Acid Hydriodic, Syrup of, Permanent, 284.
Acid Kino-tannic, Constitution of, 102.
Acid Phosphorous, Action of, on Mannite, 113.
Acid Picric, Solubility of, in Ether, 141.
Acid Picric, Stains, to Remove, 343.
Acid Salicylic, Collodion, 275.
Acid Salicylic, Detection of Minute Traces of, 150.
Acid Salicylic, Determination of, in Urine, 178.
Acid Salicylic, Presence of, in the *Violaceæ*, the Marigold, and in Cherries, 160.
Acid Salicylic, Unna's Glycero-gelatin of, 271.
Acid Salicyl-sulphonic, as Reagent for Albumin in Urine, 176.
Acid Tartaric, Distinctive Test for, 173.
Acid Tiglinic, in Chamomile Oil, 47.
Acid Vanadic, 250.
Acids, Fatty, a New Means of Identifying, 88.
Acids, Fatty, of Egg-Lecithin, 111.
Acids, Resin, of the Conifers (Tschirch and Schmidt), 152; (Easterfield and Bagley), 153.
Aconite Tincture, Alkaloidal Assay of (Beuttner), 86.
Actinium, Radiant Energy of, 16.
Adhesive Plaster, Manufacture and Spreading of, 257.
Adhesive Rubber Plaster, 300.
Adrenaline in Pulmonary Hæmoptysis, 188.
Adrenaline, Soluble Powder of, 260.
Adrenaline to Counteract Cocaine Toxicity, 188.
Adrenaline Hydrochloride in Hæmorrhage of Typhoid, 188.

Adrian — : Function of Alcohol in Preservation of Chloroform, 51.
Adulterant of Citronella Oil, Nature of, 61.
Adulterants of Cod Liver Oil, 200.
Adulterated American Peppermint Oil, 134.
Æsco-quinine, 189, 216.
African Copaiba Oil as Adulterant of Peppermint, 133.
Agaricates of Bismuth, 195.
Airol Paste, Brün's, 260.
Ajowan Herb, Essential Oil of, 17.
Albrecht, J. : Cocaine Lactate, 199.
Alcock, F. H. : Calumba Infusion and Concentrated Solution, 480.
Alcock, F. H. : Determination of Alcoholic Strength of Liniment and Tincture of Iodine, 101.
Alcock, F. H. : Liquor Ferri Perchlor. Fort., 111.
Alcock, F. H. : Method of Manipulation in Preparing Sulphur Iodide, 308.
Alcock, F. H. : *Pilula Ferri*, 297.
Alcock, F. H. : Sodium Arsenate Solution, 302.
Alcock, F. H. : Sulphates in Antimony Chloride Solution, 26.
Alcock, F. H. : Tincture of Cinnamon, 266.
Alcohol Conversion Table. Facing 593.
Alcohol, Determination of, 81.
Alcohol in Chloroform, Preservative Action of, 51.
Alcoholic Extract of Hyoscyamus, Powdered, Standardized, 464.
Alcoholic Extracts, Powdered, Standardized, 464.
Alcoholic Strength of Tincture and Liniment of Iodine, Determination of, 101.
Aldehydes and Ketones, Determination of, 17.
Aldehydes, Aromatic and Fatty, Determination of, 59.
Algerian Essential Oils, Two New, 20.
Alkaline Antiseptic Solution, 262.
Alkalinity of Lead Acetate, 288.
Alkaloid, Mydriatic, Disputed Presence of, in *Lactuca virosa*, 105.
Alkaloidal Assay of Aconite Tincture (Beuttner), 86.
Alkaloidal Assay of Belladonna Leaves (Beuttner), 86.
Alkaloidal Assay of Cinchona (Léger), 125.
Alkaloidal Assay of Cinchona Extract (Beuttner), 86.
Alkaloidal Assay of Cinchona Fluid Extract (Beuttner), 85.
Alkaloidal Assay of Cinchona Tincture (Beuttner), 86.
Alkaloidal Assay of Coca Leaves and Fluid Extract (Beuttner), 87.
Alkaloidal Assay of Coffee, 105.
Alkaloidal Assay of Drugs, Improved General Method of (Lyons), 189.
Alkaloidal Assay of Extracts and Tinctures, 85.
Alkaloidal Assay of Guarana, 104.
Alkaloidal Assay of Hyoscyamus Leaves, Extract and Tincture (Beuttner), 87.
Aklaloidal Assay of Ignatius' Beans (Léger), 124.
Alkaloidal Assay of Ipecacuanha (Léger), 125.
Alkaloidal Assay of Ipecacuanha, Fluid Extract of (Beuttner), 86.
Alkaloidal Assay of Ipecacuanha Tincture or Wine (Beuttner), 87.
Alkaloidal Assay of Kola Nut (Léger), 103.
Alkaloidal Assay of Nux Vomica (Léger), 123.
Alkaloidal Assay of Nux Vomica Extract (Beuttner), 86.
Alkaloidal Assay of Pomegranate Bark (Léger), 145.
Alkaloidal Assay of Tea, 104.
Alkaloidal Assay of Tincture of Nux Vomica (Beuttner), 86.
Alkaloidal Drugs, Improved General Method of Assay of, 189.
Alkaloidal Methyl Bromides, 21.
Alkaloidal Standards for Galenical Preparations of Belladonna, 263.
Alkaloidal Standards for Galenical Preparations of Colchicum, 268.
Alkaloidal Standard for Gelsemium Tincture, 279.
Alkaloidal Standard for Hyoscyamus, 216.
Alkaloidal Standard for Liquid Extract of Coca, 267.
Alkaloids, Distribution of, in *Conium maculatum*, 69.
Alkaloids of Cusparia, 173.
Alkaloids of Ipecacuanha, Determination and Separation of (Paterson), 101.

Allen, A. H., and A. R. Tankard: Determination of Boric Acid in Cider, Fruits, etc., 483.
Almond Cream, 315.
Almond Meal, 315.
Almond, Peach and Apricot Oil, Fixed; Characters of, 22.
Almond Shell Powder as Adulterant of Gentian Root Powder, 214.
Aloe Wood, East Indian, 190.
α- and β-Eucaine, Tests for, 24.
Alphozone, 190.
Alsol in Eye Diseases, 190.
Alum Curd, 261.
Aluminium Bronze Evaporating Basins, 273.
Aluminium Succinate in *Orites excelsa*, 25.
Alumnol, Incompatibles of, 292.
American Colophony, Constituents of (Tschirch and Studer), (Fahrion), 68.
American Orange-flower Oil, 129.
American Peppermint Oil, Adulterated, 134.
Ammonia-free Water, 180.
Ammonium Acetate, Lead in, 110.
Ammonium Valerianate Solution, Pierlot's, 277.
Ammonol, Incompatibles of, 292.
Analgesic Ointment of Anæsthesine, 261.
Anæsthesine, Pharmacy of, 261.
Anæsthetic Ether, 81.
Anæsthetic Solution (Bonain's), 276.
Analysis of Brandy, 42.
André's (Thalleioquin) Reaction for Detection of Quinine, 150.
Andropogon Oil, Cameroon, 25.
Anisal, Determination of, 18.
Annatto, Colour Reaction for, 26.
Ant-acid Mixture, 278.
Anthemis nobilis, Constituents of Essential Oil of, 26.
Anthrasol, Pharmacy of, 261.
Antidote for Nicotine, Caffeine as, 231.
Antihæmorrhoidal Drops, 315.
Antikamnia, 262.
Antimony Chloride Solution, Sulphates in, 26.
Antipyreticum Americanum, 262.
Antipyrine and Salophene, New Reactions for, 26.
Antiseptic Powder, Soluble, 262.
Antiseptic Solution, Alkaline, 262.
Anton, A.: *Aspidium athamanticum*, 35.
Ants, Spirit of, 275.
Apomorphine methyl-bromide, 21.
Apomorphine methyl-chloride, 21.
Apopin Oil, 27.
Apricot Oil, Fixed, Characters of, 22.
Aqua Imperialis Ph. Ital. II., 262.
Aquillaria agallocha, Eagle Wood or Aloe Wood, Lignum Aloes Wood, 190.
Arheol, 192.
Arnica montana, Arnisterin in, 27.
Arnisterin, 27.
Aromatic Cachous, 315.
Aromatic Castor Oil, 265.
Aromatic Cod Liver Oil, 268.
Aromatic Elixir (Scoville), 262.
Arsenic, Biological Test for, 28.
Arsenic, Detection and Determination of Minute Traces of (Gautier), 29.
Arsenic, Detection of Minute Traces of, in Organic Matter (Bertrand), 30.
Arsenic, Detection of, in Caramel, 33.
Arsenic, Detection of, in Glucose, 33.
Arsenic, Detection of, in Malt, 33.
Arsenic, Detection of, in Wort and Beer, 33.
Arsenic, Electrolytic Estimation of Minute Quantities of (Sand and Hackford), 33.
Arsenic, Electrolytic Method for Detecting Minute Quantities of (Thorpe), 30.
Arsenious Iodide, Volumetric Determination of, 34.
Arsenic Tri-iodide, Method of Preparation, 34.
Artemisia vulgaris, Japanese, Essential Oil of, 35.
Artificial Camphor, 45.
Asaprol, Colour Reactions for, 15.
Ash of Certain Drugs (J. C. Umney), 203.
Ash of Crude Drugs and Compounds (Chattaway and Moor), 206.
Aspidium athamanticum, 35.
Aspidium spinulosum, Fixed Oil of, 36.
Assay of Alkaloidal Drugs, Improved Method of (Lyons), 189.
Assay of Crude Cocaine, 62.
Assay of Digitalis Tinctures, Chemical and Physiological, 541.

Assay of Phosphorized Oil, 140.
Assay of Sulphurated Lime, 173.
Astruc, A. and J. Robert: Gum Acacia to Prevent Precipitation of Incompatibles, 283.
Attalea excelsa Fat, 126.
Attalea maripa Fat, 126.
Attalea spectabilis Fat, 126.
Atropine Methyl Bromide, 193.
Aucubin, Further Notes on, 36.
Austrian Turpentine, Constituents of, 144.

B.

Bacillus typhosus and *B. coli communis*, Digalski and Conradi's Method for Differentiation of, 315.
Bagley, G., and T. H. Easterfield: Resin Acids of the Coniferæ, 153.
Bailey, V.: *Stipa vaseyi*, a Narcotic Grass, 170.
Baird, J. W., and F. F. Sleeper: Fixed Oil of Stramonium Seed, 76.
Baldock, —: Dental Nerve-killing Paste, 270.
Balsam, Canada, 196.
Balsam, Cativo, 198.
Balsam, Oregon, 196.
Bamber, R.: Sensitive Test for Insoluble Adulterants in Citronella Oil, 62.
Bamberg, G.: Sanoform, 239.
Bardet, G.: Quinoform, 237.
Barger, G., and W. V. Shaw: Chemical and Physiological Assay of Digitalis Tinctures, 541.
Barjansky, J.: Maretin, 229.
Barral, E.: Colour Reaction for Abrastol (Asaprol), 15.
Barral, E.: Colour Reactions of Pilocarpine, 141.
Barral, E.: Distinctive Reactions for Acetanilide and Phenacetin, 16.
Barral, E.: Reactions for Hermophenyl, 99.
Barrie, T. S.: Alkalinity of Lead Acetate, 288.
Barringtonia speciosa, Constituents of, 36.
Basis for Bougies and Crayons, 269.
Basis for Suppositories, 269.
Bassière, —: Fixed Oil of *Euterpe olearacea*, 84.
Bassière, —: Oils of Certain Palms from French Guiana, 126.
Baugé: Crystalline Chromous Tartrate, 51.
Bay Rum, 316.
Beck, J. J., and J. W. Brandel: Distribution of Essential Oil in *Monarda fistulosa*, 117.
Beer, Detection of Arsenic in, 33.
Beer, Detection of Saccharin in, 159.
Beeswax, Portuguese, 193.
Beilschmieda Bark, So-called, 194.
Bell, A. E.: Biological Test for Arsenic, 28.
Belladonna, Alkaloidal Standard for Galenical Preparations of, 263.
Belladonna Extract, Alkaloidal Assay of (Beuttner), 86.
Belladonna Leaves, Alkaloidal Assay of (Beuttner), 87.
Belladonna Tincture, Alkaloidal Assay of (Beuttner), 87.
Ben Oil, Characters of, 37.
Bennett, C. T.: Detection of Metallic Contamination in Citric and Tartaric Acid and Salts, 60.
Bennett, C. T.: Lead in Acetic Acid and Ammonium Acetate, 110.
Bennett, C. T., and E. J. Parry: Adulterated American Peppermint Oil, 134.
Bennett, C. T., and E. J. Parry: Adulterated Oil of Spike Lavender, 169.
Bennett, C. T., and E. J. Parry: Adulteration of Peppermint Oil with African Copaiba Oil, 133.
Bennett, C. T., and E. J. Parry: Physical Characters of East Indian Sandal Wood, 161.
Bennett, C. T., and J. C. Umney: American Orange Flower Oil, 129.
Bennett, C. T., and J. C. Umney: Fish Liver Oil, 88.
Benzaldehyde, Determination of, 18.
Benzin U.S.P., 139.
Benzoin, Compound Tincture of, Determination of Total Solids in, 37.
Benzonaphthol, Detection of Free Naphthol in, 39.
Benzoyl-Salicin Preparation of, 506.
Benzozone, 187.
Béringer, G. M.: New Reactions for Antipyrine and Salophene, 26.
Béringer, G. M.: Soft Soap, 302.
Bermudan Essential Oil of *Myrcia acris*, 122.

Berthelot, M. P. E. : Inefficacy of Naphthalin as an Insecticide, 339.
Berthelot, M. P. E. : Limits of the Olfactory Sense for Odours, 340.
Bertrand, G. : Detection of Minute Traces of Arsenic in Organic Matter, 30.
β-Eucaine, Tests for, 24.
Bettink, H. W., and J. L. Heyl : Kilangit, an Indian Fish Poison, 102.
Beulaygue, L. : Sodium Monosulphide or Potassium Ferrocyanide as Indicators in, 159.
Beuttner, E. : Alkaloidal Assay of Extracts and Tinctures, 85.
Bickern, W. : *Casimiroa edulis*, 46.
Bidet's Liquid Vesicant, 277.
Biochemical Synthesis of Olein and Esters, 128.
Biogen and Dermogen, 194.
Biological Test for Arsenic, 28.
Birch Toilet Water, 316.
Bird, F. C. J. : Alcohol Conversion Table. Facing 593.
Bird, F. C. J. : Desiderata in a Future Pharmacopœia, 562.
Bismone, Colloidal Bismuth Oxide, 195.
Bismuth Agaricates, 195.
Bismuth, Colorimetric Determination of, 38.
Bismuth Lactate, Method of Preparation, 40.
Bismuth Phthalate, Mellate and Pyrophoric Bismuth, 40.
Bismuth Salicylate, Test for Salicylic Acid in, 40.
Bismuth Salts and Alkaline Iodides, Incompatibility of, 263.
Bismutho-protocatechuic Acid, 41.
Black Mustard Seed, Fixed Oil of, 128.
Black Sampson, 210.
Blacking, Paste, 340.
Blaise, E. E. : Constituents of Essential Oil of *Anthemis nobilis*, 26.
Blaise, E. E. : Tiglinic and Angelic Acid in Chamomile Oil, 47.
Blau, H. : Determination and Distribution of Colchicine in the Seed, 66.
Blondlot, R. : Discovery of, and Experiments with N-rays, 328 *et seq.*
Blondlot, R. : Phosphorescence excited by Ponderable Matter, 342.
Blood and Bloodstains, Human, Differentiation from Animal, 316.
Blunt, W. A. : Reaction for Nitrites and for Zinc in Water, 179.
Boa, P. : Glycerin of Pepsin, 280.
Boldo Leaves, Essential Oil of, 42.
Bonain's Anæsthetic Solution, 276.
Books, Preservation of, in Hot Climates, 344.
Bordas, F. : Resistance of Rats to Arsenic, 345.
Boric Acid, Determination of, in Cider and Fruits, 483.
Boric Acid, Glycerin of, 280.
Borneol in Camphor Oil, 46.
Bornyval, 195.
Boroglycerin Suppositories, 264.
Bott, G. : Rapid Method of Removing Ink Stains, 325.
Boucher, —, and — Boungne : Detection of Saccharin in Beers and Wines, 159.
Boudin's Anæsthetic Solution, 276.
Bougault, J. : Solubility of Picric Acid in Ether, 141.
Bougies, Basis for, 269.
Boungne, —, and — Boucher : Detection of Saccharin in Beers and Wines, 159.
Bouquet d'Amour, 342.
Bouquet Sachet, 347.
Bouquets, New Synthetic, 317.
Bourquelot, E. : Incompatibility of Gum Acacia due to Oxidizing Ferment, 282.
Bourquelot, E. : Sucrose in Vegetables, 172.
Bourquelot, E., and H. Hérissey : Further Notes on Aucubin, 36.
Bourquelot, E., and H. Hérissey : Essential Oil of *Geum urbanum*, 93.
Bourquelot, E., and H. Hérissey : Lactase and Emulsin, 105.
Bouveault, L., and — Gourmand : Synthesis of Rhodinol, 155.
B.P.C. : Concerts and Dance, 590.
B.P.C. : Constitution, 365.
B.P.C. : Election of Officers, 585.
B.P.C. : Excursion into Derbyshire, 590.
B.P.C. : Financial Statement, 439.
B.P.C. : Foreign and Colonial Members, 367.
B.P.C. : Formulary, 403.
B.P.C. : Formulary Committee Report, 442.

B.P.C. : Formulary, Discussion on, 444.
B.P.C. : Future Meeting Places, 583.
B.P.C. : General Business, 577.
B.P.C. : General Meeting, Sheffield, **1904**, 398–400.
B.P.C. : Honorary Members, 366.
B.P.C. : Incubation of, 400.
B.P.C. : Luncheons, 591.
B.P.C. : Nomination Form, 365.
B.P.C. : Officers of Sheffield Meeting, **1904**, 393.
B.P.C. : Place of Meeting for **1905**, 582.
B.P.C. : Presentation from the Bell and Hills Fund, 578.
B.P.C. : Presentation to Mr. F. Ransom, 579.
B.P.C. : Presidential Address, 400.
B.P.C. : Programme of Sheffield Meeting, **1904**, 394–395.
B.P.C. : Reception, 587.
B.P.C. : Reception of Delegates to, 434.
B.P.C. : Report of Executive Committee, 436.
B.P.C. : Rules, 365.
B.P.C. : Transactions, 363–592.
B.P.C. : Visit to Works, 589.
B.P.C. : Visitors at Sheffield Meeting, **1904**, 396 598.
B.P.C. : Votes of Condolence, 577.
B.P.C. : Votes of Thanks, 586.
Brachin, A. : Carbohydrates in Mace and Nutmegs, 231.
Brandel, J. W. : Distribution of Essential Oil in *Monarda fistulosa*, 117.
Brandel, J. W. : Essential Oil of *Monarda didyma*, 117.
Brandel, J. W. : Ethereal Oil, 273.
Brandy, Method of Analysis for, 42.
Branson, F. W. : Correction Scale for the Dimmock-Branson Uric Acid Process, 525.
Bredemann, — : Method of Extraction and Determination, 67.
Bridal Bouquet, 318.
Brilliantines, 318.
Bromidia, 264.
Bromine, Action of, on Strychnine, 171.
Bromipin Emulsion, 264.
Bromoquinol, 196.
Browne, F. : Preservation of Books in Hot Climates, 344.
Brucine Ethyl Bromide, 22.
Brucine Methyl-Bromide, 22.
Brucine Methyl-Nitrate, 22.
Brunel, L. J., and C. Marie : Volumetric Determination of Persulphates, 139.
Brunker, J. E. : Report upon the Results of Examination of Pharmaceutical Preparations by the Analysts of the Poor Law Unions of Ireland for two years ending March 31, **1904**, 566.
Brun's Airol Paste, 260.
Buckingham Bouquet, 342.
Burgarsky, S. : Determination of Ethyl Alcohol, 81.
Burgess, H. E. : Determination of Aldehydes and Ketones by Neutral Sulphite Method, 17.
Burgess, H. E., and T. H. Page : New Sesquiterpene in Distilled Lime Oil, 111.
Burnett, J. : Ichthyol Compounds, Ichthyol and Ichthargan, Therapeutics of, 218.
Butter, Detection of Coconut Fat in, 65.
Butter, Detection of Fluorides in, 89.

C.

Cade Oil Soap Liquid, 276.
Caffeine as Antidote for Nicotine, 231.
Caffeine Citrate, Preparation of, 264.
Cajuput Oil, 44.
Cajuput Oil, Australian, 44.
Calcium Glycerophosphate, Granulated, 275.
Calcium Ichthyol, 218.
Calcium Sulphichthyolate, Preparation of, 264.
Calcium Sulphide to Destroy Dodder, 318.
Calisaya Elixir, 265.
Calomel, Delicate Reaction for $HgCl_2$ in, 114.
Calomel Salve Mull, 271.
Calumba Infusion and Concentrated Solution, 480.
Calumba Root, Essential Oil of, 44.
Calyptranthes paniculata, Essential Oil of, 44.
Cameroon Andropogon Oil, 25.
Camphene in Camphor Oil, 46.
Camphor, Artificial, 45.
Camphor Oil, Borneol in, 46.
Camphor Oil; Terpineol, Cineol, and Camphene in, 36.

Canada and Oregon Balsams, 196.
Capsicum, Compound Liniment of, 265.
Capsules, Gelatin, 278.
Caramel, Detection of Arsenic in, 33.
Carana Elemi, 77.
Carbolic Acid Syrup, 276.
Carbolic Mouth Wash, 277.
Carbolic Vaseline for Insect Bites, 326.
Carbolic Water, 275.
Carbon Tetrachloride and Benzin Cleaning Fluid, 319.
Carbon Tetrachloride, Uses of, 319.
Caricari Elemi, 77.
Carnation Pink Bouquet, 341.
Caroline Bouquet, 341.
Carré, P.: Action of Phosphorous Acid on Mannite, 113.
Carvone, Determination of, 18.
Casimiroa edulis, 46.
Cassia Oil, Test for Rosin in, 47.
Cassie Oil from Flower Extract, 80.
Cassie, Synthetic Oil of, 47.
Castor Oil, Aromatic, 265.
Castor Oil Emulsion, Guaiaco-Saponin, 281.
Castor Oil Seeds, Hydrolyzing Action of, 319.
Catechu Syrup, 276.
Catford, J. P., and R. C. Cowley: Dilute Acids and Alkalies, B.P., 271.
Catheter Lubricant, Chinosol, 277.
Catheter Lubricant, Guyon's Pommade, 298.
Catheter Lubricant, Krause, Modified, 265.
Cativo Balsam, 198.
Cedrat Oil, Determination of Aldehydes in, 20.
Cellotropin, 198.
Cement for Handles, 324.
Cement for Metals, 319.
Cerolin, 198.
Chamomile Flowers, Contribution to Pharmacy of, 266.
Chamomile Oil, Angelic and Tiglinic Acids in, 47.
Chappel, E. J., and W. A. H. Naylor: Note on Colouring Matter of *Rosa gallica*, 475.
Charabot, E., and A. Hébert: Formation of Terpene Compounds in Plants, 174.
Charabot, E., and G. Laloue: Circulation of Odorous Principles in Plants, 339.
Characterization and Classification of Sesquiterpenes, 164.
Chattaway, W., and C. G. Moor: Ash of Crude Drug and Compounds, 206.
Chaulmoogra Oil, Characters of, 48.
Chaulmoogra Seeds, Constituents of, 48.
Chaulmoogric Acid, 49.
Chelidonine, Constitution of, 50.
Chemical and Physiological Assay of Digitalis Tinctures, 541.
Chemistry, 13–183.
Chemistry of Essential Oils (Idris), 406.
Cherries, Salicylic Acid in, 160.
Chicle, Gum, Characters of, 215.
Chilblains, Treatment of, 320.
Chinese Tallow (Hooper), 240.
Chinosol Catheter Lubricant, 277.
Chloral Acetone Chloroform, 198.
Chloretone, 187.
Chloroform, Alcohol in the Preservation of, 51.
Chloroform, Oil of, 275.
Chocolate Pastilles or Tablets, "*Trochis-Cacao*," 266.
Chromous Tartrate, Crystalline, 51.
Chrysarobin, Commercial, Constituents of, 52.
Chrysophanic Acid and Emodin, Constitution of, 53.
Chypre Bouquet, 341.
Chypre Sachet, 347.
Cider, Determination of Boric Acid in, 483.
Cider Vinegar, Analysis and Standards for, 54.
Cigarette Smoke, Analysis of, 55.
Cinchona, Alkaloidal Assay of (Léger), 125.
Cinchona Bases, Other, Detection of, in Quinine Sulphate, 151.
Cinchonine Sulphate for Coryza, 199.
Cinchotannates, Determination of, in de Vrij's Liquid Extract of Cinchona, 55.
Cineol in Camphor Oil, 46.
Cineolene, 56.
Cinnamic Aldehyde, Determination of (Burgess), 18.
Cinnamic Aldehyde, Gravimetric Determination of Hanaus, 56.
Cinnamomum pedatinervum, Essential Oil of, 58.
Cinnamon Bark Oil, Characters of, 58.

Cinnamon, Tincture of, 266.
Cistus monspeliensis and *C. salvifolius*, Essential Oils of, 58.
Citarine, 199.
Citral Content of Lemon Oil, 111.
Citral, Determination of (Burgess), 18.
Citral, Determination of (Sadtler), 59.
Citric Acid to Prevent Precipitation of Certain Tinctures, 267.
Citric and Tartaric Acids and Salts, Detection of Metallic Contamination in, 60.
Citron Oil, Determination of Citral in, 20.
Citronella Oil, Ceylon, Nature of Adulterant of, 61.
Citronella Oil, Modified Schimmel's Test for, 61.
Citronella Oil, Sensitive Test for Insoluble Adulterants (Bamber), 62.
Citronellal, Determination of, 18.
Clear Brilliantines, 318.
Clément, E.: Action of Formic Acid on the Muscular System, 213.
Clinical Thermometers, Germ Free, 323.
Coal Tar, Acetone Solution of, 276.
Coca Leaves, Structure of, 199.
Coca, Liquid Extract of, Alkaloidal Standard for, 267.
Cocaine, Crude, Assay of, 62.
Cocaine Lactate, 199.
Cocaine Toxicity, Adrenaline as Antidote to, 188.
Coconut Fat in Butter, Detection of, 65.
Cod Liver Oil, Aromatic, 268.
Cod Liver Oil and its Adulterants, 200.
Cod Liver Oil Emulsion, 268.
Cod Liver Oil Emulsion, Guaiacosaponin, 281.
Cod Liver Oil, Refractometric Examination of, 66.
Cod Liver Oil with Ferrous Iodide, 268.
Codeine Phosphate Syrup, 277.
Cohn, M.: Ichthargan Ointment, 284.
Colchicine, Determination of, and Distribution in, the Seed (Blau), 66.
Colchicine, Methodof Extraction and Determination (Bredemann), 67.
Colchicum, Alkaloidal Standard for Galenical Preparations of, 268.
Cold Cream, An Ideal, 268.
Collins, A.: Artificial Camphor, 45.
Collins, H.: Powdered Almond, Shell and Pine Wood Sawdust as Adulterant of Gentian Root, 214.
Collodion, Iodized, 275.
Collodion of Salicylic Acid, 275.
Colloidal Bismuth Oxide, 195.
Colloids, Action of Radium Rays on, 151.
Colocynth Pulp, Determination of Oil in, 200.
Collutorium Acidi Carbolici, 277.
Colophonia mauritiana, Elemi of, 67.
Colophony, American, Constituents of (Fahrion), 68.
Colophony, American, Constituents of (Tschirch and Studer), 68.
Colouring Matter of *Rosa gallica*, 475.
Colour Reaction for Annatto, 26.
Commercial Peppers, 136.
Comou Oil (Fixed), 127.
Complexion Lotion, 351.
Compound Bromoform Syrup, 276.
Compound Elixir of Orange, 275.
Compound Fluid Extract of Thyme, 310.
Compound Liniment of Capsicum, 265.
Compound Rosemary Ointment, 276.
Compound Syrup of Glycerophosphates, 281.
Compound Tincture of Benzoin, Total Solids in, 37.
Compressed Tablets, 520.
Concentrated Solution of Calumba, 480.
Conium maculatum, Distribution of Alkaloids in, 69.
Conserve, Tamarind, Laxative, 309.
Constituents, New, of Rose Oil, 158.
Constituents of *Globularia alypum*, 94.
Constituents of Gurjun Balsam, 98.
Constituents of Propolis, 148.
Constituents of Rhubarb Rhizome Cultivated in Berne, 156.
Constituents of *Spilanthes oleracea*, 170.
Constitution of Epinephrine, 78.
Constitution of Pilocarpine, 142, 143.
Convallaria Syrup, 277.

Copaiba Oil, African, as Adulterant of Peppermint, 133.
Copal of *Dipteryx odorata*, 202.
Copraol, a New Suppository Basis, 269.
Cordemoy, H., E. Heckel, and F. Schlagdenhauffen: *Dipteryx* Copal and Kino, 202.
Correction for Increase in Volume in Determination of Morphine in Opium and in Tincture of Opium (Dowzard), 121.
Correction Scale for the Dimmock-Branson Uric Acid Process, 525.
Cosmetic Cream, 320.
Cosmetic Jellies, 269.
Costa, da: Nickel Bromide Pills and Syrup, 293.
Courtail, —, and — Ostruc: Oily Solutions of Lecithin, 288.
Cousin, H.: Fatty Acids of Egg-Lecithin, 111.
Cowley, R. C., and J. P. Catford: Dilute Acids and Alkalies, B.P., 271.
Cownley, A. J.: Gaudeloupe Jaborandi, 225.
Cox, F. Hudson, and W. H. Simmonds: Iodine Absorption of Rose Oil, 158.
Crayons and Bougies, Basis for, 269.
Cream, Almond, 315.
Crédé's Colloidal Silver Ointment, 276.
Crême de Beauté, 320.
Creosotal Emulsion, 270.
Creosote, Rectal Injection of, 270.
Cresol Soap Solution, 275.
Cresol Water, 275.
Croton Oil, Characters of, 201.
Cryogenine, Quantitative Reaction for, 73.
Crystalline Chromous Tartrate, 51.
Cucumis citrullus, Fixed Oil of, 127.
Cultivation of Valerian Rhizome in Derbyshire, 557.
Cusparia Alkaloids, 73.
Cyanogen, Volumetric Estimation of, 75.
Cyanogenetic Glucoside in *Phaseolus lunatus*, 140.
Cyclogallipharic Acid, 75.
Cypress Oil as a Remedy for Whooping Cough, 201.
Cypress Oil, Constituents of, 76.

D.

Datura stramonium, Fixed Oil of Seeds, 76.
Davis, F.: Preliminary Note on *Sanseviera thyrsiflora*, 575.
Deane, H.: Mexican Scammony Root, 223.
Death Certification, 421.
Debierne, A.: Radiant Energy of Actinium, 16.
Debono, —: Incompatibility of Bismuth Salts and Alkaline Iodides, 263.
Dechan, M.: Digestive Value of Pepsin, 138.
Decomposition of Light by Liquids, 320.
Decyl Aldehyde, Determination of, 19.
Delegates to B.P.C., Reception of, 434.
Dental Nerve-killing Paste, 270.
Dermatological Preparations, Modern, 270.
Dermatological Practice, Ichthargan in, 221.
Dermogen, 194.
Desfourniaux, J.: Detection and Determination of Nitrites in Water, 180.
Desiderata in a Future Pharmacopœia, 562.
Desmoulière, A.: Presence of Salicylic Acid in the *Violaceæ*, the Marigold, and in Cherries, 160.
Detection of Saccharin in Beer or Wine, 159.
Determination of Boric Acid in Cider, Fruits, etc., 483.
Determination of Morphine in Opium (Schidrowitz), 11; (Dowzard), 119.
Determination of Nicotine (Waldbott), 123.
Determination of Nitrites in Water, 180.
Determination of Oil in Colocynth Pulp, 200.
Determination of Pyridine, 148.
Determination of Resin in Gum Scammony, Rapid Method for, 241.
Determination of Sodium Arsenate, 166.
Determination of Theobromine, 174.
Dextrin Paste (Dermatological), 271.

Diabetes, Oatmeal in, 232.
Dialyzed Extract of Ergot, 272.
Diastasic Power of Enzymic Preparations, 76.
Dieterich, R.: Solubility of Resins in Liquids, Method of Determining, 155.
Digestive Value of Pepsin, 138.
Digitalis Tinctures, Chemical and Physiological Assay of, 541.
Dill Oil, Valuation of, 18.
Dilute Acids and Alkalies, B.P., 271.
Dion, J. V.: Cosmetic Jellies, 269.
Dionine as an Ocular Analgesic, 202.
Dionine Syrup, 276.
Dipteryx odorata, a New Copal from the Fruit and Kino, from the Bark of, 202.
Disinfectant Solution, 271.
Dispensing of Resinous Tinctures, 299.
Distribution of Alkaloids in *Conium maculatum*, 69.
Diuretine, Incompatibles of, 292.
Dobbin, L.: Interaction of Sodium Arsenate and Lead Acetate, 165.
Dobbin, L.: Potassium Ferric Arsenite, 147.
Dobbin, L., and A. D. White: Simple Mode of Preparing Synthetic Populin (Benzoyl-salicin), 506.
Dodder, Calcium Sulphide to Destroy, 318.
Dokkum, L.: Colour Reaction for Annatto, 26.
Domestic Healing Ointment, 321.
Dott, D. B.: *Liquor Ferri Perchlor. Fort.*, 290.
Dott, D. B.: Manganese in Zinc Sulphate, 112.
Dott, D. B.: Morphine Standard for Opium and its Preparations, 295.
Dott, D. B.: Podophyllin, 233.
Dowzard, E.: Canada and Oregon Balsams, 196.
Dowzard, E.: Correction for Increase of Volume in Determination of Morphine in Opium and Tincture of Opium, 121.
Dowzard, E.: Determination of Morphine in Opium and in Tincture of Opium, 119.
Dowzard, E.: Determination of Oil in Colocynth Pulp, 208.
Dowzard, E.: Rapid Method for Determination of Resin in Gum Scammony, 241.
Dowzard, E.: Refractometric Examination of Cod Liver Oil, 66.
Driessen-Mareeuw, W. P. H. van den: Constituents of *Barringtonia speciosa*, 37.
Drugman, J., and W. E. Stockings: Action of H_2S on Formaldehyde and Acetaldehyde, 91.
Drugs, Ash of Certain (J. C. Umney), 203.
Drugs, Ash of Crude, and Compounds (Chattaway and Moore), 206.
Duncan, W.: Volumetric Determination of Arsenious Tri-iodide, 34.
Duplan, L.: Pharmacy of Anæsthesine, 261.
Dupuoy, R.: Method of Preparing Arsenic Tri-iodide, 34.
Dusting Powder, Ichtyoform, 219.
Dybowski, —, and — Landrin: Physiological Action of Ibogaine, 217.

E.

Eagle Wood, 190.
Easterfield, T. H., and G. Bagley: Resin Acids of the Coniferæ, 153.
Easton's Syrup, Modified Process for, 272.
Eau de Quinine Hair Wash, 321.
Eberle, E. G.: *Prosopis* (Mezquit) Gum, 236.
Echinacea angustifolia, 210.
Echinacea purpureum, 210.
Echinops Oil, 127.
Egg Shampoo, 349.
Ehrnrooth, E., and H. Marx: Differentiation of Human from Animal Blood and Bloodstains, 316.
Eigel, G.: Tests for α- and β-eucaine, 24.
Eijken, A. A.: Constituents of Rhubarb Rhizome Cultivated in Berne, 156.
Elemi, Carana, 77.
Elemi, Caricari, 77.
Elemi of *Colophonia mauritiana*, 67.
Elemi, West Indian, from Dominica, 95.
Elixir, Aromatic (Scoville), 262.
Elixir Calisaya, 265.
Elixir of Iron Peptonate, 285.
Elixir of Kola, 288.

Elixir of Orange, Compound, 275.
Embrocation, Turpentine, 312.
Emodin and Chrysophanic Acid, Constitution of, 53.
Empyroform, 211.
Emulsin and Lactase, 105.
Emulsio Iodoformi, 277.
Emulsion of Bromipin, 264.
Emulsion of Cod Liver Oil, 268.
Emulsion of Creosotal, 270.
Emulsions, Guaiaco Saponin, 281.
Entada scandens, Saponins from Seeds of, 78.
Enzymes, Diasbasic Power of, 76.
Epinephrine, 78.
Epistaxis, Lygosine-Quinine for, 228.
Epithol-Gold Varnish, 272.
Epithol-Silver Varnish, 272.
Epithol Varnishes, 272.
Ergot, Dialyzed Extract of, 272.
Erythroxylum monogynum Wood, Essential Oil of, 79.
Ess. Bouquet, 321.
Essence, Tamarind, 309.
Essence of Vanilla, 352.
Essential Oil, Determination of, in Mustard, 122.
Essential Oil of *Acacia avenia*, 15.
Essential Oil of *Acacia farnesiana*, 16.
Essential Oil of African Copaiba as Adulterant of Peppermint Oil, 133.
Essential Oil of Ajowan Herb, 17.
Essential Oil of *Andropogon*, Cameroon, 25.
Essential Oil of *Anthemis nobilis*, Constituents of, 26.
Essential Oil of Apopin, 27.
Essential Oil of Japanese *Artemisia vulgaris*, 35.
Essential Oil of Australian Cajuput, 44.
Essential Oil of Boldo Leaves, 42.
Essential Oil of Cajuput, 44.
Essential Oil of Calumba Root, 44.
Essential Oil of *Calyptranthes paniculata*, 44.
Essential Oil of Camphor, Presence of Borneol in, 46.
Essential Oil of Camphor, Terpineol, Cineol, and Camphene in, 46.
Essential Oil of Cassia, Test for Rosin in, 47.
Essential Oil of Cassie from Flower Extract, 80.
Essential Oil of Cassie, Synthetic, 47.
Essential Oil of Cedrat, Determination of Aldehydes in, 20.
Essential Oil of Chamomile, Angelic and Tiglinic Acids in, 47.
Essential Oil of Cinnamon Bark, Characters of, 58.
Essential Oil of *Cinnamomum pedatinervum*, 58.
Essential Oil of *Cistus monspeliensis* and of *C. salvifolius*, 58.
Essential Oil of Citron, Determination of Citral in, 20.
Essential Oil of Citronella, Modified Schimmel's Test for, 61.
Essential Oil of Citronella, Nature of Adulterant of, 69.
Essential Oil of Citronella, Sensitive Test for Insoluble Adulterants in, 62.
Essential Oil of Cloves, Determination of Eugenol in (Schimmels), (Thoms), 82.
Essential Oil of Cypress as a Remedy for Whooping Cough, 201.
Essential Oil of Cypress, Constituents of, 76.
Essential Oil of Dill, Valuation of, 18.
Essential Oil of East Indian Sandal Wood (Parry and Bennett), 161.
Essential Oil of *Erythroxylon monogynum*, 79.
Essential Oil of *Eucalyptus globulus*, New Sesquiterpene Alcohol in, 81.
Essential Oil of *Eupatorium capillifolium*, 83.
Essential Oil of Geranium, New Constituents of, 93.
Essential Oil of *Geum urbanum*, 93.
Essential Oil of Gingergrass, New Alcohol in, 93.
Essential Oil of Gouft, 20.
Essential Oil of *Helichrysum angustifolium*, 99.
Essential Oil of *Hyptis spicata*, 100.
Essential Oil of *Inula viscosa*, 100.
Essential Oil of Jasmin from Flower Extract, 80.
Essential Oil of Jasmin, Furtl. Notes on (Hesse), 102.
Essential Oil of *Laurus no ilis* Leaves, 107.
Essential Oil of *Laurus pectinata*, Lauric Aldehyde in, 15.
Essential Oil of Lavender, English, Official Sp. gr. of, 108.

Essential Oil of Lemon, Citral Content, 111.
Essential Oil of Lemon, Citral Determination in (Burgess), 19.
Essential Oil of Lemongrass, Valuation of, 18.
Essential Oil of Limes, Determination of Aldehydes in, 20.
Essential Oil of Limes, Distilled, New Sesquiterpene in, 111.
Essential Oil of *Magnolia kobus*, 112.
Essential Oil of *Mentha citrata*, 114.
Essential Oil of *Monarda didyma*, 117.
Essential Oil of *Monarda fistulosa*, Distribution of, in Plant, 117.
Essential Oil of *Monodora myristica*, 118.
Essential Oil of *Myrcia acris*, Bermudan, 122.
Essential Oil of Orange Flowers, American, 129.
Essential Oil of Orange Flowers, "Extracted," 129.
Essential Oil of Orange Flowers from Flower Extract, 80.
Essential Oil of Orange Flowers, Spanish, 130.
Essential Oil of Parsley, Presence of Myristicin in, 131.
Essential Oil of Patchouli, New Adulterant of, 131.
Essential Oil of Patchouli Leaves, Constituents of, 132.
Essential Oil of Pennyroyal, Valuation of, 19.
Essential Oil of Peppermint Adulterated with African Copaiba Oil, 133.
Essential Oil of Peppermint, American, Adulterated, 134.
Essential Oil of Pimento, Constituents of, 144.
Essential Oil of *Psoralea bituminosa*, 148.
Essential Oil of *Reseda* from Flower Extract, 80.
Essential Oil of Rose, French, from Flower Extract, 80.
Essential Oil of Rose, German, from Flower Extract, 80.
Essential Oil of Rose, Iodine Absorption of, 158.
Essential Oil of Rose, Two New Constituents of, 158.
Essential Oil of Shieh, 20.
Essential Oil of Siberian Fir, 164.
Essential Oil of Spearmint, Valuation of, 19.
Essential Oil of Spike, Lavender, Adulterated, 169.
Essential Oil of *Umbellularia californica*, 174.
Essential Oil of Violet from Flower Extract, 80.
Essential Oils, Chemistry of (Idris), 406.
Essential Oils, Determination of Aldehydes and Ketones in (Burgess), 17.
Essential Oils Extracted from Fresh Flowers by Volatile Solvents, 79.
Essential Oils, Grass, West Indian, 96.
Essential Oils, Two New Algerian, 20.
Esterdermasan, 211.
Esterhazy Bouquet, 341.
Estimation of Methyl Alcohol in Presence of Ethyl Alcohol, 116.
Ether, Pure, for Anæsthetic Purposes, 81.
Ethereal Oil, 273.
Ethyl Alcohol, Determination of (Burgarsky), 81.
Eucalyptol β-naphthol, 212.
Eucalyptus Formalin, 321.
Eucalyptus globulus Oil, New Sesquiterpene, Alcohol in, 81.
Eugenol, Determination of, in Clove Oil (Thoms), (Schimmels), 82.
Euguform, 212.
Eumorphol, 212.
Eunatrol Mixture, 273.
Eupatorium capillifolium, Essential Oil of, 83.
Euphorbone, 83.
Europhen, Incompatibles of, 292.
Euterpe oleracea, Fixed Oil of Seeds of, 84.
Evaporating Basins of Aluminium Bronze, 273.
Excipient for KI and HgI_2 Pills, 289.
Executive Committee, B.P.C., Report, 439.
Extract of Belladonna Leaves, Alkaloidal Assay of (Beuttner), 87.
Extract of Cinchona, Alkaloidal Assay of (Beuttner), 86.
Extract of Cinchona, Liquid, de Vrij, Determination of Cinchotannates in, 55.

Extract of Coca, Fluid, Alkaloidal Assay of (Beuttner), 87.
Extract of Hyoscyamus, Alcoholic, Standardized, Powdered, 464.
Extract of Hyoscyamus, Alkaloidal Assay of (Beuttner), 87.
Extract of Nux Vomica, Alkaloidal Assay of (Beuttner), 86.
Extract of Thymus Gland, 310.
Extracts, Alcoholic, Standardized, Powdered, 464.
Extracts and Tinctures, Alkaloidal Assay of, 85.
Eye Diseases, Ichthargan in, 222.

F.

Fahrion, W.: Constituents of American Colophony, 68.
Farr, E. H., and R. Wright: Disputed Presence of Mydriatic Alkaloid in *Lactuca virosa*, 105.
Farr, E. H., and R. Wright: Distribution of Alkaloids in *Conium maculatum*, 69.
Farr, E. H., and R. Wright: Note on Standardized Powdered Alcoholic Extracts, 464.
Farup, P.: Constituents of Fixed Oil of *Aspidium spinulosum*, 36.
Fat, "Fettponceau K" as a Selective Stain for, 322.
Fatty Acids, A New Means of Identifying, 88.
Ferments, Action of Radium Rays on, 151.
Ferrier, J. G.: Magnesium Lead, and Zinc Carbonates, Official Chemical Formulæ for, 111.
Ferrier, J. G.: Official Chemical Formulæ for Magnesium, Lead, and Zinc Carbonates, 111.
Fetron, 274.
Finnemore, H.: Liniment of Mercury, 291.
Finnemore, H.: Spurious Virginian Prune Bark, 252.
Finnemore, H.: Substitute for Tragacanth Mucilage, 311.
Fish Liver Oil, 88.
Fish Poison, Indian, Kilangit, 102.
Fluid Extract of Cinchona, Alkaloidal Assay of (Beuttner), 85.
Fluid Extract of Coca, Alkaloidal Assay of (Beuttner), 87.
Fluid Extract of Ipecacuanha, Alkaloidal Assay of (Beuttner), 86.
Fluid Extract of Licorice, Comparison of B.P. and U.S.P. Official Processes, 289.
Fluid Extract of Licorice, Correction of Acidity of, 289.
Fluid Extract of Male Fern, Activity of, 228.
Fluid Extract of Thyme, Compound, 310.
Fluid Extracts, Acetic Acid as a Menstruum for, 274.
Fluorides, Detection of, in Butter, 98.
Foisy, —: Adrenaline to Counteract Cocaine Toxicity, 188.
Folkestone Bouquet, 342.
Fomitin, 212.
Foreign and Colonial Members, B.P.C., 367–370.
Formaldehyde and Acetaldehyde, Action of H_2S on, 91.
Formaldehyde and Trioxymethylene, Method of Titration (Kleber), 92.
Formaldehyde a Normal Constituent of Combustion Products, 91.
Formaldehyde, Determination of, in Solution, 90.
Formaldehyde, Presence of, in the Atmosphere, 91.
Formation of Terpene Compounds in Plants, 174.
Formic Acid, Action of, on the Muscular System (Clément), (Garrigue), 213.
Formic Acid to Separate Iron from Aluminium, 92.
Formulæ from Formulary of Liverpool Royal Infirmary, 277.
Formulary, B.P.C., 403.
Formulary, B.P.C., Discussion on, 444.
Formulary Committee, B.P.C., Report, 442.
Formulary of Pharmaceutical Society of Antwerp, Selections from, 275.
François' Formula for Bidet's Vesicant, 277.
François, M.: Compounds of Pyridine Gold Chloride, 149.
François, M.: Determination of Pyridine in Aqueous Solution, 148.
Frangipanni Bouquet, 342.
Frangipanni Sachet, 347.
Frankforter, G. B., and A. W. Martin: Fixed Oil of *Rhus glabra* Seeds, 156.

French, R. H.: Valuation of Sulphurated Lime, 173.
Frenkel, M.: Biogen and Dermogen, 194.
Frerichs, G.: Cusparia Alkaloids, 73.
Friboes, W.: Guaiaco-Saponin Emulsions, 281.
Friboes, W.: Saponins of *Guaiacum officinale*, 97.
Friedrich, K.: Silver as an Impurity in KCN, 147.
Frieser, J. W.: Tannochrom, 247.
Fruits, Determination of Boric Acid in, 483.
Fucol, Substitute for Cod Liver Oil, 213.
Fumigating Paper, 322.
Fumigating Pastilles, 322.
Fumigating Ribbon, 322.

G.

Gadd, H. W., and S. C.: Distribution of Fat and Strychnine in Nux Vomica Seeds, 515.
Gadd, S. C. and W. H.: Distribution of Fat and Strychnine in Nux Vomica Seeds, 515.
Gallaverelin, —, and — Péhu: Theobromine as a Hypnotic, 248.
Ganassini, D.: Distinctive Test for Tartaric Acid, 173.
Gane, E. H.: Adulterants of Cod Liver Oil, 200.
Gane, E. H.: Petroleum Ether, U.S.P., 139.
Garden Cress, Fixed Oil of, 127.
Garrigou, F.: Calcium Sulphide to Destroy Dodder, 318.
Garrigue, L.: Action of Formic Acid on the Organism, 213.
Garsed, W.: Assay of Crude Cocaine, 62.
Gautier, A: Detection and Determination of Minute Traces of Arsenic, 29.
Gauze, Ichthyoform, 220.
Gauze, Iodoform, and Salol, 285.
Gay, G.: Citric Acid to Prevent Precipitation of Certain Tinctures, 267.
Gelatin Capsules, 278.
Gelatin for Silvering Pills, 279.
Gelsemium Tincture, Alkaloidal Standard for, 279.
General Business, B.P.C., 577.
General Meeting, B.P.C., Sheffield, 1904, 398–400.
Gentian Root Powder Adulterated with Powdered Almond Shell and Pine Wood, 214.
Genvresse, P.: Action of Paraformaldehyde on Sesquiterpenes, 164.
Genvresse, P.: Pulegone Nitrosite, 148.
Geranium Oil, New Constituents of, 93.
Gerber, E.: Constituents of *Spilanthes oleracea*, 170.
Germ Free Clinical Thermometers, 323.
German Rose Oil from Flower Extract, 80.
Germania Bouquet, 342.
Germicide, 279.
Gerrard, A. W.: Manufacture and Spreading of Adhesive Plaster, 257.
Geum urbanum, Essential Oil of, 93.
Gilg, E., H. Thoms, and H. Schedel: Pharmacognosy and Chemical Constituents of *Strophanthus gratus*, 244.
Gilson, E.: Ponticin, New Glucoside from Rhubarb, 146.
Gingergrass Oil, New Alcohol in, 93.
Gladhill, J. W.: Commercial Peppers, 136.
Globularia alypun, Constituents of, 94.
Globularia Citrin, 94.
Globularic Acid, 94.
Glove Cleaning Powder, 323.
Glucose, Detection of Arsenic in, 33.
Glucoside, New, from Rhubarb, 146.
Glucoside, New, Gynocardin, 99.
Glucoside, New, Herniarin, 100.
Glue, Liquid, 327.
Glycerin as Pill Excipient, 279.
Glycerin Cream, 323.
Glycerin of Pepsin, 289.
Glycerin Suppositories, 280.
Glycerinum Acidi Borici, 280.
Glycerinum Sodii Cinnamatis, 281.
Glycerin in Soap, Determination of, 95.
Glycerogelatina acid. salicylic. (Unna), 271.
Glycerogelatina iodoformi (Unna), 271.
Glycerogelatina Zinci dura (Unna), 271.
Glycerogelatins, Dermatological, 277.

Glycerophosphates, Compound Syrup of, 281.
Glyceroplasma Kaolini, 271.
Goeller, —: Presence of Heliotropin in Certain Vanillas, 250.
Golobew, Essential Oil of Siberian Fir, 164.
Gommier Resin, 95.
Gonorrhœa, Ichthargan in, 220.
Good, —: Toxicity of Lithium Salts, 227.
Gordin, H. M.: Xanthoxylins, 180.
Gornall, F. H., and F. B. Power: Constituents of Chaulmoogra Seeds, 48.
Gornall, F. H., and F. B. Power: Chaulmoogric Acid, 49.
Gornall, F. H., and F. B. Power: Gynocardin, 99.
Gouft Oil, 20.
Gouladze, L. S.: Sodium Sozoiodate, 243.
Goulding, E.: Essential Oil of *Cinnamomum pedatinervum*, 58.
Gourmand, —, and L. Bouveault: Synthesis of Rhodinol, 155.
Graeser, —: Adrenaline Hydrochloride in Hæmorrhage of Typhoid, 188.
Grains to Grammes, Table for Conversion of, 594.
Granular Effervescent Preparations, 281.
Granulated Glycerophosphate of Calcium, 275.
Granulated Kola, 276.
Granules, Lecithin, 288.
Gray, C. E., J. B. Weems, and E. C. Myers: Water Free from Ammonia, 180.
Greenish, H. G.: Contribution to the Pharmacy of Chamomile Flowers, 266.
Greenish, H. G.: Saturated Solutions of Official Salts, 300.
Greenish, H. G.: Structure of Coca Leaves, 199.
Greenish, H. G., and E. Collin: Vegetable Powders and their Diagnostic Characters, 251.
Greenish, H. G., and F. A. Upsher Smith: Solubilities of Chemical Substances Mentioned in the B.P. **1898**, 303, 304.
Greiff, B. de: Salmon Oil, 161.
Grein, —: New Glucoside in *Herniara glabra*, 100.
Greshoff, —, and J. Sack: Constituents of Propolis, 148.
Griggi, G.: Rapid Detection of Turmeric in Powdered Rhubarb, 249.
Grimbert, L., Detection of Urobilin in Urine, 178.
Guadeloupe Jaborandi, 225, 233.
Guaiaco Saponin Emulsions, 281.
Guaiacum officinale, Saponins of 97.
Guerin, G.: Distinctive Reaction for Nickel and Cobalt, 123.
Guigues, P.: Comparison of B.P. and U.S.P. Official Processes for Fluid Extract of Licorice, 289.
Gulli, S., and H. Stavenhagen: Citral Content of Lemon Oil, 111.
Gum Acacia, Incompatibility of, due to Oxidizing Ferment, 282.
Gum Acacia to Prevent Precipitation of Incompatibles, 283.
Gum Chicle, Characters of, 215.
Gurjun Balsam, Constituents of, 98.
Guyon's Pommade, 298.
Gymnema sylvestre, Lævo-quercitol from Leaves of, 98.
Gymnema sylvestre Leaves, Chemical Examination of, 526.
Gynocardia Oil, 98.
Gynocardin, a New Cyanogenetic Glucoside, 99.
Gynæcological Affections, Ichthargan in, 221.

H.

Hackford, J. E., and H. J. S. Sand: Electrolytic Estimation of Minute Quantities of Arsenic, 33.
Haefelin, H.: Creosotal Emulsion, 270.
Hæmalbumin Solution, Perdynamin, 283.
Hæmoglobin, Action of Radium Rays on, 151.
Hæmoglobin Solution, 284.
Hair Cream, Lanoline, 326.
Hair Dye, Walnut, 354.
Hair, Loss of, Pomade for, 323.
Hair Wash and Stimulant, 323.
Hair Wash, Eau de Quinine, 321.
Hallberg, C. S. N.: Adhesive Rubber Plaster, 300.
Hallberg, C. S. N.: Lead Plaster, 288.
Hanaus, J.: Gravimetric Determination of Cinnamic Aldehyde, 56.
Handle Cement, 324.

Hantke, E.: Valuation of Hops, 216.
Harness Preparations, 324.
Hartshorn, Characters of True Empyreumatic Oil of, 215.
Hébert, A., and E. Charabot: Formation of Terpene Compounds in Plants, 174.
Hebra's Ointment, 276.
Hebra's Spirit of Soap, 275.
Heckel, E., H. der Cordemoy, and F. Schlagenhauffen: Dipteryx, Copal and Kino, 202.
Hedley, A. S.: Adrenaline in Pulmonary Hæmoptysis, 188.
Helgland, J. M. A.: Preparation of Calcium Sulphichthyolate, 264.
Helichrysum angustifolium, Essential Oil of, 99.
Heliotrope Brilliantine, 318.
Heliotrope Perfume, 324.
Heliotrope Sachet, 347.
Heliotropin in Certain Vanillas, 250.
Henri, A., and A. Meyer: Action of Radium Rays on Colloids, Hæmoglobin, Ferments, and Red Blood Corpuscles, 151.
Henriet, H.: Presence of Formaldehyde in the Atmosphere, 91.
Heroin, Incompatibles of, 293.
Herring Roe, Hard and Soft, Constituents of, 324.
Hérissey, H., and E. Bourquelot: Essential Oil of *Geum urbanum*, 93.
Hérissey, H., and E. Bourquelot: Further Notes on Aucubin, 36.
Hérissey, H., and E. Bourquelot: Lactase and Emulsin, 105.
Hermophenyl, Reactions for, 99.
Herniara glabra, New Glucoside in, 100.
Hesse, A.: Further Notes on Essential Oil of Jasmin, 102.
Hetralin, 215.
Heye, J. L., and H. W. Bettink: Kilangit, an Indian Fish Poison, 102.
Hinshelwood, J.: Dionine as an Ocular Analgesic, 202.
Hirschof, —: Eumorphol, 212.
Hirschsohn, E.: Characters of Chaulmoogra Oil, 48.
Hirschsohn, E.: Characters of True Empyreumatic Oil of Hartshorn, 215.
Hirschsohn, E.: Distinction of Ursone from Cholesterol, 179.
Hirschsohn, E.: Reagent for Myrrh, 231.
Holdermann, E.: Mercury Oxycyanides, 116.
Holmes, E. M.: Guadeloupe Jaborandi, 225, 233.
Holmes, E. M.: *Ipomœa orizabensis*, Mexican Scammony Root, 223.
Holmes, E. M.: *Spermacoce indica*, 243.
Holmes, J., and T. E. Thorpe: Estimation of Methyl Alcohol in Presence of Ethyl Alcohol, 116.
Home Members, B.P.C., 371–389.
Honeysuckle Bouquet, 325.
Honorary Members, B.P.C., 366.
Hooper, D.: *Aquillaria agallocha*, Eagle of Aloe Wood, Lignum Aloes Wood, 190.
Hooper, D.: *Sapium sebiferum*, Chinese or Vegetable Tallow, 240.
Hooper, D.: Seeds of *Spermacoce indica*, 243.
Hooper, E. S.: So-called Beilschmieda Bark, 194.
Hopea odorata, Resin from Burmah, 100.
Hopp, L. C.: Improved Suppository Moulds, 308.
Hops and Hop Substitutes, Detection of Arsenic in, 33.
Hops, Valuation of, 216.
Horse Chestnut, Therapeutic Properties of, 216.
Hugouneng, H.: Constituents of Hard and Soft Herring Roe, 324.
Human and Animal Blood and Bloodstains, Differentiation between, 216.
Hungarian Pommade in Tubes, 325.
Hyacinth Bouquet, 325.
Hydriodic Acid as a Microscopical Reagent for Blood, 316.
Hydriodic Acid, Permanent Syrup of (Raubenheimer), 284.
Hydroacetyl Dioxide, 216.
Hydrolyzing Action of Castor Oil Seeds, 319.
Hyoscyamus, Alkaloidal Standard for (Maben), 216.
Hyoscyamus Extract, Alcoholic, Powdered, Standardized, 464.
Hyoscyamus, Leaves, Extract and Tincture, Alkaloidal Assay of (Beuttner), 87.

Hypodermic Injection of Morphine and Camphor, 291.
Hyptis spicata, Essential Oil of, 100.

I.

Ibogaine, Physiological Action of, 217.
Ichthargan, 218.
Ichthargan in Gonorrhœa, 220.
Ichthargan Ointment, 284.
Ichthoform, 218.
Ichthoform Dusting Powder, 219.
Ichthoform Gauze, 220.
Ichthyol Compounds, Ichthyoform and Ichthargan, Therapeutics of, 218.
Ichthyol, Incompatibles of, 293.
Ichthyol Paste, Unna's, 271.
Ichthyol Soap, Liquid, 276.
Idris, T. H. W.: Presidential Address, B.P.C., 400.
Imperial Water, 262.
Incompatibility of Bismuth Salts and Alkaline Iodides, 263.
Incompatibility of Gum Acacia due to Oxidizing Ferment, 282.
Incompatibles of Alumnol, 292.
Incompatibles of Ammonal, 292.
Incompatibles of Diuretine, 292.
Incompatibles of Europhen, 292.
Incompatibles of Heroine, 293.
Incompatibles of Ichthyol, 293.
Incompatibles of Phenocoll Hydrochloride, 293.
Incompatibles of Piperazine, 293.
Incompatibles of Protargol, 293.
Incompatibles of Salophen, 293.
Indian Fish Poison, Kilangit, 102.
Infusion of Calumba, 480.
Injection, Hypodermic, of Morphine and Camphor, 291.
Injection of Anæsthesine Mercury, 261.
Injection of Anæsthesine, Urethrovesical, 261.
Injection, Rectal, of Creosote, 270.
Ink Eraser Powder, 325.
Ink Stains, Rapid Method of Removing, 325.
Insect Bites, Carbolic Vaseline for, 326.
Introduction, pp. 1–12.
Inula viscosa, Essential Oil of, 100.
Iodine, Action of, on Strychnine, 171.
Iodine Number of Pure Lard, 107.
Iodine Tincture and Liniment, Determination of Alcoholic Strength of, 101.
Iodized Collodion, 275.
Iodoform and Salol Gauze, 285.
Iodoform Emulsion, 277.
Iodoform Glycerogelatin, Unna's, 271.
Iodotannin Syrup, 285.
Iodylin, 223.
Iothin, 223.
Ipecacuanha, Alkaloidal Assay of (Léger), 125.
Ipecacuanha, Determination and Separation of Mixed Alkaloids in (Paterson), 101.
Ipecacuanha, Fluid Extract, Alkaloidal Assay of, 86.
Ipomœa orizabensis, Mexican Scammony Root, 223.
Iron and Aluminium, Formic Acid for Separating, 92.
Iron Peptonate Elixir, 285.
Iron Peptonate Scales, 285.

J.

Jaborandi Alkaloids, Physiological Action of, 224.
Jaborandi, Guadeloupe, 225.
Jaborandi Syrup, 277.
Jasmin Oil from Flower Extract, 80.
Jasmin Oil, Further Notes on (Hesse), 102.
Jeancard, P. and C. Satie: Two New Algerian Essential Oils, "Gouft" and "Shieh," 20.
Jellies, Cosmetic, 269.
Jockey Club Sachet, 348.
Johnson, A. S.: Iron Peptonate Scales, 285.
Jones, H. Williams: A Liquid Form of *Linimentum Potassii Iodide cum Sapone*, 509.
Journals Receiving Presentation Copies of *Year-Book*, 391.
Jowett, H. A. D.: Constitution of Epinephrine, 78.
Jowett, H. A. D.: Constitution of Pilocarpine, 142.
Jowett, H. A. D., and C. E. Potter: Comparison of Physiological Properties of Pilocarpine with 1 : 4 (or 1 : 5) Dimethylglyoxaline and 1 : 3 Dimethylpyrazole, 232.
Jowett, H. A. D., and C. E. Potter: Constituents of Commercial Chrysarobin, 52.
Jowett, H. A. D., and C. E. Potter:

Constitution of Chrysophanic Acid and Emodin, 53.

K.

Kadsara Bouquet, 318.
Kaolin Paste, 271.
Kaposi's *Lotio Crinalis*, 327.
Kastanol, 216.
Katz, — : Determination of Free Phosphorous, 140.
Katz, — : Quantitative Determination of Theobromine, 174.
Kava-kava, Yangonin from, 181.
Keimazu, K. : Apopin Oil, 27.
Ketones, and Aldehydes, Determination of, 17.
Kid Glove Cleaner (Paste), 326.
Kilangit, an Indian Fish Poison, 102.
King's Pills, 276.
Kino of *Dipteryx odorata*, 202.
Kino-tannic Acid, Constitution of, 102.
Kleber, C., Formaldehydé and Trioxymethylene, Method of Titration, 92.
Klobb, T : Arnisterin, 27.
Knight, W. : Turpentine Liniment, 312.
Koerner, —, and—Vanzelli : Olivile, 128.
Kola Elixir, 288.
Kola, Granulated, 276.
Kola Nut, Guarana, Tea, and Coffee, Assay of, 103.
Kola Tincture, 277.
Kraemer, —, and — Sarthou : Determination of Melting Point of Resins and Waxes, 114.
Krause's Catheter Lubricant, Modified, 265.
Kunz-Krauze, H., and P. Schelle : Cyclogallipharic Acid, 75.

L.

Labadie-Lagrave : Lithium Arrhenal, 226.
Lactase and Emulsin, 105.
Lactuca virosa, Disputed Presence of Mydriatic Alkaloid, 105.
Lahache, — : Detection of Cocoanut Fat in Butter, 65.
Laloue, G., and E. Charabot : Circulation of Odorous Principles in Plants, 339.
Landrin, —, and Dybowski : Physiological Action of Ibogaine, 217.
Lanoline Hair Cream, 326.
Lapersonne, F. de : Stovaine, 244.
Lard, Occurrence of Pure, with High Iodine Number, 107.
Lassar's Dilute Resorcin Paste, 270.
Lassar's Naphthol Paste, 270.
Lassar's Zinc-salicyl Paste, 270.
Lauric Aldehyde in Oil of Abies Pectinata, 15.
Laurus nobilis, Essential Oil of the Leaves of, 107.
Lavender Oil, English, Official Sp. gr. of, 108.
Lavender Sachet, 348.
Laxative Tamarind Conserve, 309.
Leach, A. E., and H. C. Lythgoe : Analysis and Standards for Cider Vinegar, 54.
Lead Acetate, Alkalinity of, 288.
Lead Acetate and Sodium Arsenate, Interaction of, 165.
Lead Carbonate, Official Formulæ for, 111.
Lead in Acetic Acid and Ammonium Acetate, 110.
Lead Oleate, 288.
Lead Plaster ; Lead Oleate, 288.
Leather Polish, Liquid, 326.
Lecithin Granules, 288.
Lecithin in Oily Solutions, 288.
Lecithin of Egg, Fatty Acids of, 111.
Leclair, — : Iodoform or Salol Gauze, 285.
Leclère, A. : Formic Acid to Separate Iron from Aluminium, 92.
Ledermann, — : Hetralin, 215.
Lees, F. H. : Derivatives of Umbellulone, 175.
Lees, F. H., and H. B. Power : Constituents of Essential Oil of *Umbellularia californica*, 179.
Lefebore, — : Sodium Cacodylate in Phosphaturia, 242.
Léger, E. : Assay of Kola Nut, Guarana, Tea and Coffee, 103.
Léger, E. : Detection of Quinine by André's (Thalleioquin) Reaction, 150.
Léger, E. : Determination of Total Alkaloids in Pomegranate Bark, 145.
Lemeland, P. : Gum of *Mangifera indica*, 228.
Lemme, G. : Determination of Formaldehyde in Solution, 90.
Lemon Oil, Citral Content, 111.
Lemon Oil, Citral Determination of (Burgess), 19.
Lemongrass, Essential Oil of, Valuation of, 18.

Lerat, L.: Oxidation of Vanillin by *Russula* Ferment and by Gum Acacia, 353.
Lewis, S. J.: Improved Process for Liquid Extract of Nux Vomica, 293.
Lewkowitsch, J.: Almond, Peach and Apricot Oils, Fixed, Characters of, 22.
Lewkowitsch, J.: Characters of Ben Oil, 37.
Lewkowitsch, J.: Fixed Oil of Seeds of *Melia azedarach*, 113.
Lewkowitsch, J.: Fixed Oil of *Pongamia glabia*, 146.
Leys, A., Detection of Fluorides in Butter, 89.
Libraries Receiving Presentation Copies of *Year-Book*, 391.
Lichens on Cascarilla Bark, 326.
Licorice Fluid, Extract of, Comparison of B.P. and U.S.P. Official Processes, 289.
Licorice, Fluid Extract, Correction of Acidity of, 289.
Licorice Syrup, 277.
Licorice Water, 275.
Lignaloe Sachet, 348.
Lignum Aloes Wood, East Indian, 190.
Lily of the Valley Brilliantine, 318.
Lime Oil, Determination of Aldehydes in, 20.
Limene, 111.
Limes, Essential Oil of, Distilled, New Sesquiterpene in, 111.
Liniment, Compound, of Capsicum, 265.
Liniment of Iodine, Determination of Alcoholic Strength of, 107.
Liniment of Mercury, 291.
Liniment, Turpentine, 312.
Linimentum Potassii Iodidi cum sapone, Liquid form of, 509.
Liotard, E.: Eucalyptol β-naphthol, 212.
Liotard, E.: Thymyl Trichloracetate, 249.
Liquid Cade Oil Soap, 276.
Liquid Extract of Coca, Alkaloidal Standard for, 267.
Liquid Extract of Nux Vomica, Improved Process for, 293.
Liquid Form of *Linimentum Potassii Iodidi cum Sapone*, 509.
Liquid Glue, 327.
Liquid Ichthyol Soap, 276.
Liquid Leather Polish, 326.
Liquid Rouge, 346.
Liquid Tar Soap, 276.
Liquor Ferri Mangani Peptonati Triplex, 290.
Liquor Ferri Peptonati Saccharat., 285.
Liquor Ferri Perchlor. Fort. (Alcock), 111; (Dott), 290.
Liquor Santal Flav. c. Cubeb. et Buchu, 291.
Lithium Agaricate, 226.
Lithium Arrhenal, 226.
Lithium Benzoate in Gouty Corneal Opacity, 226.
Lithium Chlorhydromethyl-arsenate, 226.
Lithium Salts, Toxicity of, 227.
Little, —: Palatable Syrup of Magnesium Sulphate, 309.
Lloyd, J. U.: *Echinacea angustifolia*, 210.
Locquin, R.: A New Means of Identifying Fatty Acids, 88.
Loewenbach, G.: Mercury Iodocacodylate, 230.
Lohmann, W.: Physiological Action of Large Doses of Saponin, 241.
Lohmann, J. H.: Podophyllum Resin, 235.
Lord Plymouth's Pot Pourri, 344.
Lorenzen, F.: Vanilla Essence, 352.
Lothian, T.: Glycerin Suppositories, 280.
Lothian, J.: Granular Effervescent Preparations, 281.
Lothian, J.: Soft and Hard Soaps, 302.
Lotio Crinalis (Kaposi), 327.
Lotio Rubra (L.R.I.), 277.
Lotio Spiritus (L.R.I.), 277.
Lotion of Anæsthesine, 261.
Lucas, E. W.: Evaporating Basins of Aluminium Bronze, 273.
Lucas, E. W.: Oxymel of Squill, 303.
Lucas, E. W., and H. B. Stevens: *Pilula Ferri*, 297.
Ludewig, —, and — Petersen: Yeast in Glanders, 355.
Lunan, G.: *Glycerinum Acidi Borici*, 280.
Lygosine and Sodium Lygosinate, 227.
Lygosine Quinine, 228.
Lyon, W.: Correction of Acidity in Fluid Extract of Licorice, 289.
Lyon, W.: Test for Free Salicylic

Acid in Bismuth Salicylate, 40.
Lysargine, 228.
Lythgoe, H. C., and A. E. Leach: Analysis and Standards for Cider Vinegar, 54.

M.

Maben, T.: Alkaloidal Standards for Galenical Preparations of Belladonna, 263.
Maben, T.: Alkaloidal Standard for Galenical Preparations of Colchicum, 268.
Maben, T.: Alkaloidal Standard for Hyoscyamus, 216.
Maben, T.: Alkaloidal Standard for Liquid Extract of Coca, 267.
Maben, T.: Alkaloidal Standard for Tincture of Gelsemium, 279.
Maben, T.: Notes on Suggested Standards for Official Tinctures, 310.
Maben, T.: Standard for Podophyllum Resin, 298.
MacDowall, J.: Volumetric Determination of Cyanogen, 75.
Mace and Nutmegs, Carbohydrates in, 231.
Magnesia Magma; Milk of Magnesia, 291.
Magnesium, Lead, and Zinc Carbonates, Official Chemical Formulæ for, 111.
Magnolia kobus, Essential Oil of, 112.
Maize Stigma Syrup, 277.
Male Fern, Fluid Extract of, Activity of, 220.
Malt, Detection of Arsenic in, 33.
Malt Substitutes, Glucose and Caramel, Detection of Arsenic in, 33.
Manganese in Zinc Sulphate, 112.
Mangifera indica, Gum of, 228.
Mannamine, 112.
Mannich, C.: Oil of Cameroon *Andropogon*, 25.
Mannite, Action of Phosphorous Acid on, 113.
Mansie, —: Decomposition of Light by Liquids, 320.
Mansier, —: Soluble Powder of Adrenaline, 260.
Maquenne, L., and L. Phillippe: Ricinine, 157.
Maretin, 229.
Marie, C., and L. J. Brunel: Volumetric Determination of Persulphates, 139.
Marigold, Salicylic Acid in 160.
Maripa Fat, 126.
Marsden, P. H.: Extract of Thymus Gland, 310.
Marsden, P. H.: Formulæ from Formulary of Liverpool Royal Infirmary, 277.
Marsden, P. H.: *Glycerinum Sodii Cinnamatis*, 281.
Marsden, P. H.: *Lotio Crinalis* Kaposi's, 327.
Marsden, P. H.: Medicated Pastilles, 296.
Marsden, P. H.: Modified Krause's Cathether Lubricant, 265.
Marsden, P. H.: Pommade Guyon, 298.
Marsden, P. H.: Toison's Fluid for Blood Counts, 351.
Marshall, C. R.: Physiological Action of Jaborandi Alkaloids, 224.
Martin, A. W., and G. B. Frankforter: Fixed Oil of *Rhus glabra* Seeds, 156.
Martin, E.: Determination of Glycerin in Soap, 95.
Martin, L.: Action of Bromine and Iodine on Strychnine, 171.
Martindale, W. Harrison: Notes on Radio-activity, 489.
Marx, H., and E. Ehrnrooth: Differentiation of Human from Animal Blood and Bloodstains 316.
Materia Medica, 187–254.
Maustbaum, Portuguese Beeswax, 193.
Mazet, Lithium Benzoate in Gouty Corneal Opacity, 226.
Medicated Pastilles, 296.
Meldrum, M.: Excipient of Potassium Iodide and Mercuric Iodide Pills, 298.
Meldrum, M.: Paraldehyde Mixture, 296.
Melia azedarach, Fixed Oil of Seeds of, 113.
Mellière, G.: Colour Reactions of Yohimbine, 183.
Melting Point Determination of Resins and Waxes, 114.
Members B.P.C., Foreign and Colonial, 367.
Members, B.P.C., Home, 371.
Members, B.P.C., Honorary, 366.

Mentha citrata, Essential Oil of, 114.
Menthol Mixture, 278.
Menthyl Glycolate, 230.
Mercuric Chloride, Delicate Reaction for, in Mercurous Salts, 114.
Mercuric Chloride Salve Mull, 271.
Mercuric Methyl-Arsenate, 115.
Mercurous Methyl-Arsenate, 115.
Mercury Cacodylate, 230.
Mercury Iodo-cacodylate, 230.
Mercury, Liniment of, 291.
Mercury Methyl-Arsenates, 115.
Mercury Oxycyanides (Richard), 115; (Holdermann), 116.
Merl, P.: Detection of Minute Traces of Salicylic Acid, 160.
Merson, G. F.: Preparation of Caffeine Citrate, 264.
Metallic Contamination of Citric and Tartaric Acid and Salts, Detection of, 60.
Metals, Cement for, 319.
Methyl Alcohol, Estimation of in Presence of Ethyl Alcohol, 116.
Methyl Aspirine, 231.
Metric System, 411.
Mexican Scammony Root, 223.
Meyer, A., and V. Henri: Action of Radium Rays on Colloids, Hæmoglobin Ferments, and Red Blood Corpuscles, 151.
Mezquit Gum, 236.
Michaelis, L.: "Fettponceau K." as Selective Stain for Fat, 322.
Milk of Magnesia, 291.
Millefleurs Sachet, 348.
Mineral Acid in Vinegar, and Acetic Acid, Detection and Determination of, 16.
Mistura Antacida (L.R.I.), 278.
Mistura Mentholis (L.R.I.), 278.
Mistura Neurasthenica (L.R.I.), 278.
Mistura Potassii Iodid. Comp. (L.R.I.), 278.
Mistura Tonica (L.R.I.), 278.
Mistura Tonica Acida (L.R.I.), 278.
Mixture, Eunatrol, 273.
Moissan, H.: Action of Silicon on Water at near 100°C., 165.
Molle, B., and H. Thoms: Cineolene, 56.
Molle, B., and H. Thoms: Essential Oil of *Laurus nobilis* Leaves, 107.
Mona Bouquet, 327.
Monarda didyma, Essential Oil of, 117.
Monarda fistulosa, Essential Oil of, Distribution in Plant, 117.
Monodora myristica, Essential Oil of, 118.
Moor, C. G., and W. Chattaway: Ash of Crude Drugs and Compounds, 206.
Moringa pterygosperma, Fixed Oil of, 37.
Morphine and Camphor, Hypodermic Injection of, 291.
Morphine, Determination of in Opium (Schidrowitz), 118.
Morphine, Determination of, in Opium and Tincture of Opium (Dowzard), 119, 121.
Morphine Standard for Opium and its Preparations, 295.
Moulin, A.: Delicate Reaction for $HgCl_2$ in HgCl and Other Mercurous Salts, 114.
Mounier, P.: Basis for Bougies and Crayons, 269.
Moureu, C., and A. Valeur: Sparteine, 166.
Moureu, C., and A. Valeur: Composition and Volumetric Determination of Sparteine Sulphate, 169.
Mucilage of Tragacanth, Substitute for, 311.
Mueller, P.: Salite, 239.
Mulls, Salve, 271.
Murray, C., Detection of Albumin in Urine by Means of Salicylsulphonic Acid, 176.
Mustard, Determination of Essential Oil in, 122.
Mustard Seeds, Black and White, Fixed Oil of, 128.
"Mutter Salbe," 321.
Mydriatic Alkaloid, Disputed Presence of, in *Lactuca Virosa*, 105.
Myers, E. C., J. B. Weems, and C. E. Gray: Water Free from Ammonia, 180.
Myrcia acris (Bayleaf), Essential Oil of, from Bermuda, 122.
Myristicin in French Parsley Oil, 137.
Myrrh, Reagent for, 231.

N.

N-Rays, Summarized Record of Recently Published Notes on, 327–339.
Nagel, —: Activity of Fluid Extract of Male Fern, 228.
Nail Polishes, 339.

Naphthalin, Inefficacy of, as an Insecticide, 329.
Naphthol, Free, in Benzo-naphthol, Detection of, 39.
Naphthol Paste, Lassar's, 270.
Narcyl, 231.
Nash, L. M.: Fixed Oil of Seeds of *Sapium sebiferum*; Chinese Tallow Seed Oil, 162.
Naylor, W. A. H.: Sodium Arsenate, Official, and Solution of Sodium Arsenate, 166.
Naylor, W. A. H., and E. J. Chappel: Note on Colouring Matter of *Rosa gallica*, 475.
Nerol, Characters of, 122.
Nerve Killing Paste, Dental, 270.
Neuronal, 231.
Neutral Sulphate, Method for Determination of Aldehydes and Ketones, 17.
New Mown Hay Sachet, 349.
Newer Remedies, Incompatibles of Certain, 292.
Nickel and Cobalt, Distinctive Reaction for, 123.
Nickel Bromide Pills and Syrup, 293.
Nicotine, Caffeine as Antidote for, 231.
Nicotine, Determination of, in Tobacco Products (Waldbott), 123.
Nigger Head, 210.
Night Blooming Cereus Bouquet, 341.
Nitrites in Water, Detection and Determination of (Desfourniaux), 80.
Nitrites in Water, Reaction for (Blunt), 179.
Nonyl Aldehyde, Determination of, 19.
Noorden, C. von: Oatmeal in Diabetes, 232.
Norrenburg, H.: Fucol, a Substitute for Cod Liver Oil, 213.
Notes and Formulæ, 315–355.
Nutmeg, Carbohydrates in, 231.
Nux Vomica Extract, Alkaloidal Assay of (Beuttner), 86.
Nux Vomica, Liquid Extract, Improved Process for, 293.
Nux Vomica, St. Ignatius' Beans, Ipecacuanha and Cinchona, Alkaloidal Assay of (Léger), 123.
Nux Vomica Seeds, Distribution of Fat and Strychnine in, 515.

O.

Oatmeal in Diabetes, 232.
Obituary, 402.
O'Connell, J. F.: Rosamond Lotion, 346.
O'Connell, J. F.: Rose Glycerin Jelly, 346.
Odorous Principles in Plants, Circulation of, 339.
Odours, Limits of the Olfactory Sense for, 340.
Œnocarpus bacala, Fixed Oil of, 127.
Œnocarpus batana, Fixed Oil of, 127.
Oil, Castor, Aromatic, 265.
Oil, Castor, Guaiaco Saponin Emulsions of, 281.
Oil, Cod Liver, Aromatic, 268.
Oil, Cod Liver, Emulsion, 268.
Oil, Cod Liver, Guaiaco Saponin Emulsions of, 281.
Oil, Cod Liver, with Ferrous Iodide, 268.
Oil, Ethereal, 273.
Oil, Fixed (Ben), 37.
Oil, Fixed (Chaulmoogra), 48.
Oil, Fixed, of *Aspidium spinulosum*, 36.
Oil, Fixed, of Black Mustard Seed, 128.
Oil, Fixed, of Chinese Tallow Seed, 162.
Oil, Fixed, of Comou, 127.
Oil, Fixed, of Croton, 201.
Oil, Fixed, of *Echinops*, 127.
Oil, Fixed, of *Euterpe oleracea*, 84.
Oil, Fixed, of Garden Cress, 127.
Oil, Fixed, of *Gynocardia*, 98.
Oil, Fixed, of *Maripa*, 126.
Oil, Fixed, of *Melia azedarach* Seeds, 113.
Oil, Fixed, of *Moringa pterygosperma*, 37.
Oil, Fixed, of *Perilla*, 127.
Oil, Fixed, of *Pongamia glabra*, 146.
Oil, Fixed, of Radish Seed, 128.
Oil, Fixed, of *Rhus glabra* Seeds, 156.
Oil, Fixed, of Salmon, 161.
Oil, Fixed, of *Sapium sebiferum*, 162.
Oil, Fixed, of *Stramonium* Seed, 76.
Oil, Fixed, of Tea Seed, 127.
Oil, Fixed, of Water Melon Seed, 127.
Oil, Fixed, of White Mustard Seed, 128.
Oil of Chloroform, 275.

Oil of Fish Liver, 88.
Oil of Hartshorn (Empyreumatic), Characters of, 215.
Oils, Fixed, of Certain Palms, from French Guiana, 126.
Oils, Fixed, Some New or Little Known, 127.
Ointment, Anæsthesine, 261.
Ointment, Anthrasol, 261.
Ointment, Colloidal Silver (Crédé's), 276.
Ointment, Compound of Rosemary, 276.
Ointment, Domestic, Healing, 321.
Ointment, Domestic, Universal, 352.
Ointment, Hebra's, 276.
Ointment, Ichthargan, 284.
Ointment, Pilewort, 296.
Ointment, Soothing, 350.
Ointment, Wilkinson's, with Anthrasol, 262.
Ointments and Varnishes, Skin Coloured, 294.
Olein and Esters, Biochemical Synthesis of, 128.
Oleo-Balsamic Mixture, 265.
Olivile, 128.
Opium and its Preparations, Morphine Standard for, 295.
Opium, Determination of Morphine in (Schidrowitz), 118.
Opoponax Sachet, 348.
Orange, Compound Elixir of, 275.
Orange Flower, Oil, Essential American, 129.
Orange Flower Oil, Essential from Flower Extract, 80.
Orange Flower Oil, Spanish, 130.
Orange Flowers, "Extracted," Essential Oil of, 129.
Oregon Balsam, 196.
Orient, J.: Lygosine and Sodium Lygosinate, 227.
Orites excelsa, Aluminium Succinate in, 25.
Ostruc, —, and Courtail: Oily Solutions of Lecithin, 288.
Ottow, W. M.: Euphorbone, 83.
Oxymel of Squill, 303.

P.

Page, T. H., and H. E. Burgess: New Sesquiterpene in Distilled Lime Oil, 111.
Pagliari's Hæmostatic Water, 296.
Palatable Syrup of Magnesium Sulphate, 309.
Panna Root, 35.
Paraldehyde Mixture, 296.
Parry, E. J.: West Indian Grass Oils, 96.
Parry, E. J., and C. T. Bennett: Adulterated American Peppermint Oil, 134.
Parry, E. J., and C. T. Bennett: Adulterated Spike Lavender Oil, 169.
Parry, E. J., and C. T. Bennett: Adulteration of Peppermint Oil with African Copaiba Oil, 133.
Parry, E. J., and C. T. Bennett: Physical Characters of East Indian Sandal Wood Oil, 161.
Parsley Oil, French, Presence of Myristicin in, 131.
Pasta Cubebæ et Copaibæ (L.R.I.), 278.
Pasta Dextrinata, 271.
Pasta Ichthyoli (Unna), 271.
Pasta Kaolini, 271.
Pasta Naptholi (Lassar), 270.
Pasta Resorcini mitis (Lassar), 270.
Pasta Zinci (Lassar), 270.
Pasta Zinci Mollis (Unna), 270.
Pasta Zinci Sulphurata (Unna), 271.
Paste, Anthrasol, 261.
Paste Blacking, 340.
Paste, Glycerin, of Anthrasol, 262.
Paste, Protargol, 298.
Pastilles, Chocolate, 266.
Pastilles, Medicated, 296.
Pastilli Ammonii Chloride, 296.
Pastilli Codeinæ, 296.
Pastilli Mentholis, 296.
Patava Oil, 127.
Patchouli, Essential Oil of, Constituents of, 132.
Patchouli, Essential Oil of, New Adulterant of, 131.
Patein, G.: Quantitative Reaction for Cryogenine, 73.
Patent Leather Varnish, 340.
Paterson, A. G. C.: Determination and Separation of Mixed Alkaloids of Ipecacuanha, 101.
Peach Oil, Fixed, Characters of, 22.
Pehu, —, and — Gallaverelin: Theobromine as a Hypnotic, 248.
Pennyroyal, Essential Oil of, Valuation of, 19.
Peppermint, Early History of, and Modern Commercial Development, 232.
Peppermint Oil, Adulterated with African Copaiba Oil, 133.
Peppers, Commercial, 136.

Pepsin, Digestive Value of, 138.
Pepsin, Glycerin of, 280.
Perdynamin, 283.
Perfumes for Toilet Soaps, 340.
Perfumes, Recent Formulæ for, 341.
Perilla Oil, 127.
Perry, G. E. : Modified Process for Easton's Syrup, 272.
Persian Lilac Bouquet, 317.
Persulphates, Alkaline, Volumetric Determination of, 139.
Petersen, —, and — Ludewig: Yeast in Glanders, 354.
Petroleum Ether, 139.
Pfeiffer, R. : Esterdermasan, 211.
Pharmacy, 257–312.
Pharmacy and Poison Laws of Great Britain, and of Ireland, 599–600.
Pharmacy Legislation, 411.
Pharmacy of Anæsthesine, 261.
Pharmacy of Anthrasol, 261.
Pharmacy of Chamomile Flowers, 266.
Phaseolunatin, New Cyanogenetic Glucoside, 140.
Phaseolus lunatus, New Glucoside in, 140.
Phenacetin, and Acetanilide, Distinctive Reactions for, 16.
Phenocoll Hydrochloride, Incompatibles of, 293.
Phenol Syrup, 276.
Phenylhydrazine Oxalate as Reagent for Sugar in Urine, 178.
Phillippe, L., and L. Maquenne : Ricinine, 157.
Phisalix, C. : Natural Immunity of Vipers to Viper Venom, 353.
Phosphorescence Excited by Ponderable Matter given off byCertain Substances, 342.
Phosphorized Oil, Assay of, 140.
Phosphorus, Free, Quantitative Determination of, 140.
Physiological Action of Ibogaine, 217.
Physiological Action of Saponin, 241.
Phytin, 141.
Pick, L : Alsol in Eye Diseases, 190.
Picric Acid, Solubility of, in Ether, 141.
Picric Acid Stains, to Remove, 343.
Picroglobularin, 94.
Pierlot's Ammonium Valerianate Syrup, 277.
Pilewort Ointment and Suppositories, 296.
Pill Excipient, Glycerin as, 279.
Pill Excipients, 296.
Pill, Iron (Lucas and Stevens), (Alcock), 297.
Pills Gelatin for Silvering, 279.
Pills, King's, 276.
Pills, Nickel Bromide, 293.
Pills, Potassium Iodide and Mercuric Iodide Excipient for, 298.
Pills, Rhubarb and Quinine, 276.
Pilocarpine, Colour Reactions of, 141.
Pilocarpine, Comparison of Physiological Properties with 1 : 4 (or 1 : 5) Dimethyl Glyoscaline and 1 : 3 Dimethyl Pyrazole, 232.
Pilocarpine, Constitution of, 142.
Pilocarpus racemosus, Guadeloupe Jaborandi, 233.
Pilula Ferri (Lucas and Stevens), (Alcock), 297.
Pimento, Constituents of the Essential Oil of, 144.
Pinafore Bouquet, 343.
Pine Wood Sawdust as Adulterant of Powdered Gentian, 214.
Pinot Oil, 84.
Pinus laricio (Austrian) Turpentine, Constituents of, 144.
Piperazine, Incompatibles of, 293.
Piper methysticum, Yangonin from, 181.
Pistacia lentiscus, Constituents of the Resin of, 144.
Planés, P. : Colorimetric Determination of Bismuth, 39.
Plaster, Lead, 288.
Podophyllin (Dott), 233.
Podophyllum Resin (Lohmann), 235.
Podophyllum Resin, Standard for, 298.
Poison Legislation, Position of, 418.
Polacci, E. : Detection of Sulphocyanide in Saliva by Means of HgCl., 161.
Polishing Paste, 343.
Pollak, A. : Diastasic Power of Enzymic Preparations, 76.
Pomade for Loss of Hair, 323.
Pomade, Hungarian, in Tubes, 325.
Pomegranate Bark, Determination of Total Alkaloids in, 145.
Pommade Guyon, 298.
Pongamia glabra, Fixed Oil of, 146.

Pontag, J.: Analysis of Cigarette Smoke, 55.
Ponticin, New Glucoside from Rhubarb, 146.
Populin, Synthetic, A Simple Mode of Preparing, 506.
Portuguese Beeswax, 193.
Postal Regulations, 601–603.
Posternak, S.: Phytin, 141.
Potassium Cyanide, Silver as an Impurity in, 147.
Potassium Ferric Arsenite, 147.
Potassium Iodide and Mercuric Iodide Pills, Excipient for, 298.
Pot Pourri Powders, 344.
Potter, C. E., and H. A. D. Jowett: Comparison of Physiological Properties of Pilocarpine with 1 : 4 (or 1 : 5) Dimethyl Glyoxaline and 1 : 3 Dimethyl Pyrazole, 232.
Potter, C. E., and H. A. D. Jowett: Constitution of Chrysarobin and Emodin, 53.
Potter, C. E., and H. A. D. Jowett: Constituents of Commercial Chrysarobin, 52.
Pottevin, H.: Biochemical Synthesis of Olein and Esters, 128.
Powder, Antiseptic, Soluble, 262.
Power, F. B., and F. H. Gornall: Chaulmoogric Acid, 49.
Power, F. B., and F. H. Gornall: Constituents of Chaulmoogra Seeds, 48.
Power, F. B., and F. H. Gornall: Gynocardin, 99.
Power, F. B., and F. H. Lees: Constituents of Essential Oil of *Umbellularia californica*, 174.
Power, F. B., and F. Tutin: Chemical Examination of *Gymnema sylvestre* Leaves, 526.
Power, F. B., and F. Tutin: Lævo-quercitol from *Gymnema sylvestre*, 98.
Prescriptions, Repetition of, 429.
Presentation to Mr. F. Ransom, 579.
Preservation of Books in Hot Climates, 344.
Presidential Address, B.P.C., 400.
Princess Bouquet, 345.
Profit Assessment, 603-604.
Propolis, Constituents of, 148.
Prosopis (Mezquit) Gum, 236.
Protargol, Incompatibles of, 293.
Protargol Paste, 298.
Provincial Associations Receiving Presentation Copies of *Year-Book*, 391.
Pschorr, R.: Alkaloidal Methyl-bromides, 21.
Psoralea bituminosa, Essential Oil of, 148.
Publications Received by Editor of *Year-Book*, 391.
Pulegone Nitrosite, 148.
Putz Pommades, 345.
Pyrenol or Pyrane, 236.
Pyridine, Determination of, in Aqueous Solution, 148.
Pyridine Gold Chloride, Compounds of, 149.

Q.

Quaternary Salts of Alkaloids, Some New, 21.
Quercitol Lævo-rotatory from Leaves of *Gymnema sylvestre*, 98.
Quinine, Detection of, by André's Thalleioquin Reaction, 150.
Quinine Dimethyl-bromide, 22.
Quinine Methyl-bromide, 22.
Quinine Methyl-nitrate, 22.
Quinine Methyl-sulphate, 22.
Quinine Sulphate, Detection of Other Cinchona Bases in, 151.
Quinine Tannate, Tasteless, 298.
Quinoform, 237.

R.

Radiant Energy of Actinium, 16.
Radio-activity, Notes on, 489.
Radish Seed Oil, 128.
Radium Rays, Action of, on Colloids, Hæmoglobin Ferments and Red Blood Corpuscles, 151.
Radium Rays, Action of, on Viper Venom, 152.
Radium, Therapeutic Application of, 237.
Rami's Syrup, 276.
Ramsden, W.: Some Properties of Urea, 352.
Ransom, F.: Presentation to, 579.
Rats, Resistance of, to Arsenic, 345.
Raubenheimer, O.: Carbon Tetrachloride and Benzin Cleansing Fluid, 319.
Raubenheimer, O.: Permanent Syrup of Hydriodic Acid, 284.
Raubenheimer, O.: Uses of Carbon Tetrachloride, 319.
Rausch, H.: Skin Coloured Ointments and Varnishes, 294.

Reactions, New, for Antipyrine and Salophene, 26.
Reagent for Myrrh, 234.
Red Blood Corpuscles, Action of Radium Rays on, 151.
Reform in Public Dispensing, 428.
Refractometric Examination of Cod Liver Oil, 66.
Relation of Imperial to Metric Standards of Mass, Capacity and Length, 604.
Remington, J. P.: Acetic Acid as Menstruum for Fluid Extracts, 274.
Repetition of Prescriptions, 429.
Report upon the Results of Examination of Pharmaceutical Preparations by the Analysts of the Poor Law Unions of Ireland, for Two Years ending March 31, **1904**, 566.
Research List, **1904**, 359–362.
Reseda Brilliantine, 318.
Reseda Oil from Flower Extract, 80.
Resin Acids of theConifers (Tschirch and Schmidt), 152; (Easterfield and Bagley), 153.
Resin of *Hopea odorata* from Burmah, 100.
Resin of *Pistacia lentiscus*, Constituents of, 144.
Resinous Tinctures, Dispensing, 299.
Resins and Waxes, Determination of Melting Point, 114.
Resins, Method of Determining the Solubility in Various Liquids, 155.
Resorcin PasteDilute(Lassar's),270.
Reutter, L., and A. Tschirch: Caricari Elemi, 77.
Reutter, L., and A. Tschirch: Resin of *Pistacia lentiscus*, 144.
Rheumasan, 238.
Rhodinol, Synthesis of, 155.
Rhubarb and Quinine Pills, 276.
Rhubarb, Detection of Turmeric in, 249.
Rhubarb, New Glucoside, Ponticin, from, 146.
Rhubarb Rhizome Cultivated in Berne, Constituents of, 156.
Rhus glabra Seeds, Fixed Oil of, 156.
Richard, —: Mercury Oxycyanides, 115.
Richardson, W. D.: Occurrence of Pure Lard with High Iodine Number, 107.
Ricinine, 157.
Riegler, E.: Detection of Sugar in Urine with Phenylhydrazine Oxalate, 178.
Robinin, 158.
Rodwell, H.: Compressed Tablets, 520.
Roe, G.: Solubility of Strychnine in Presence of Alkalies and Iodides, in Mixtures, 306.
Rondeletia Sachet, 348.
Rosa gallica, Colouring Matter of, 475.
Rosamond Lotion, 346.
Rose, Glycerin Jelly, 346.
Rosemary Ointment, Compound, 276.
Rosenbach, O.: Carbolic Vaseline for Insect Bites, 326.
Rose of Shirah Bouquet, 317.
Rose Oil, French, from Flower Extract, 80.
Rose Oil, Iodine Absorption of, 158.
Rose Oil, Two New Constituents of, 158.
Rose Sachet, 348.
Rosin in Cassia Oil, Test for, 47.
Rouge Tablets, 347.
Rouge, Theatrical, 346.
Roux, E.: Mannamine, 112.
Rubber Plaster, Adhesive, 300.
Ruddemann, E. A.: Incompatibles of Some Newer Remedies, 292.
Ruellia ciliosa, An Adulterant of *Spigelia*, 244.
Ryde Bouquet, 347.

S.

Saal, O., and A. Tschirch: Carana Elemi, 77.
Saal, O., and A. Tschirch: Elemi of *Colophonia*, 67.
Saccharimetry, Sodium Monosulphide or Potassium Ferrocyanide as Indicators in, 159.
Saccharin, Detection of, in Beers and Wines, 159.
Sachet Powders, 347.
Sack, J., and — Greshoff: Constituents of Propolis, 148.
Sadtler, S. S.: Determination of Citral and other Aldehydes, 59.
St. Ignatius' Beans, Alkaloidal Assay of (Léger), 124.
Saint-Serin, —: Mercury Methyl arsenates, 115.
Salibromin, 238.

Salicylic Acid, Detection of Minute Traces of, 160.
Salicylic Acid, Presence of, in the *Violaceæ*, Marigold, and in Cherries, 160.
Salicylsulphonic Acid as Reagent for Albumin in Urine, 176.
Salite, 239.
Salmon Oil, 161.
Saliva, Detection of Sulphocyanide in, by Means of HgCl, 161.
Salocreol, 239.
Salol Gauze, 285.
Salophen, Incompatibles of, 293.
Salophene, Reactions for, 26.
Salve Mulls, 271.
Sand, H. J. S., and J. E. Hackford: Electrolytic Estimation of Minute Quantities of Arsenic, 33.
Sandal Wood Oil, East Indian, Physical Characters of (Parry and Bennett), 161.
Sanoform, 239.
Sanosin, 240.
Sanseviera thyrsifloria, Preliminary Note on, 575.
Saponaceous Tooth Paste, 349.
Saponin, Physiological Action of Large Doses of, 241.
Saponins from *Entada scandens* seeds, 78.
Saponins of *Guaiacum officinale*, 97.
Sapium sebiferum, Chinese or Vegetable Tallow, 240.
Saponium sebiferum, Fixed Oil of, Chinese Tallow Seed Oil, 162.
Saratoga Nosegay, 341.
Sarthou, —, and L. Kraemer: Determination of Melting Point of Resins and Waxes, 114.
Saturated Solutions of Official Salts, 300.
Saugon, L., and E. Urbain: Hydrolyzing Action of Castor Oil Seeds, 319.
Saul, J. E.: Test for Turmeric, 250.
Sawyer, Sir James: Pilewort Ointment and Suppositories, 296.
Scales of Iron Peptonate, 285.
Scammony Gum, Rapid Method for Determination of Resin in, 241.
Scammony Root, Mexican, 223.
Schedel, H., E. Gilg, and H. Thoms: Pharmacognosy and Chemical Constituents of *Strophanthus gratus*, 244.
Schidrowitz, S.: Detection and Determination of Mineral Acid in Acetic Acid and Vinegar, 16.
Schidrowitz, P.: Determination of Morphine in Opium, 118.
Schimmel's Test, for Citronella Oil, Modified, 61.
Schindelmeiser, S.: Gynocardia Oil, 98.
Schlagenhaufften, F., E. Heckel, and H. de Cordemoy: Dipteryx Copal and Kino, 202.
Schlotterbeck, J. O., and H. C. Watkins: Constitution of Enelidonine, 50.
Schmidt, G., and A. Tschirch: Constituents of Austrian Turpentine, 144.
Schmidt, G., and A. Tschirch: Resin Acids of the Conifers, 152.
Schreiner, O.: Characterization and Classification of Sesquiterpenes, 164.
Scoville, W. L.: Aromatic Elixir, 262.
Searl, A.: Detection of Yeast Extract, 182.
Senft, Lichens on Cascarilla Bark, 326.
Separation of Dispensing from Prescribing, 423.
Sesquiterpene Alcohol, New in *Eucalyptus globulus* Oil, 81.
Sesquiterpenes, New, in Distilled Lime Oil, 111.
Sesquiterpenes, Action of Paraformaldehyde on, 164.
Sesquiterpenes, Characterization and Classification of, 164.
Shampoo, Egg, 349.
Shampoo Pastes, 349.
Shaving Cream, 349.
Shaw, W. V., and G. Barger: Chemical and Physiological Assay of Digitalis Tinctures, 541.
Shieh Oil, 20.
Siberian Fir, Essential Oil of, 164.
Siboni, —: Compound Syrup of Glycerophosphates, 281.
Sicilian Bouquet, 349
Sigalus, C.: Characters of Croton Oil, 201.
Silicon, Action of, on Water at near 100°C, 165.
Silin, 242.
Silver as an Impurity in Potassium Cyanide, 147.
Silver, Colloidal, Crédé's, Ointment of, 276.

Silver Marking Ink, 350.
Silver Soap, 350.
Silvering Pills, Gelatin for, 279.
Simmons, W. H. : New Adulterant of Essential Oil of Patchouli, 131.
Simmonds, W. H., and F. Hudson Cox : Iodine Absorption of Rose Oil, 158.
Skin-coloured Ointments and Varnishes, 294.
Sleeper, F. G., and J. W. Baird : Fixed Oil of Stramonium Seed, 76.
Smith, H. G. : Aluminium Succinate in *Orites excelsa*, 25.
Smith, F. A. Upsher, and H. G. Greenish : Solubility of Chemicals Mentioned in the B.P., 1898, 303.
Smith, F. A. Upsher : Substances Liable to Decomposition by Light, 351.
Soap, Determination of Glycerin in, 95.
Soap, Solution of Cresol, 275.
Soap Spirit, Hebra's, 275.
Soaps, Soft and Hard, 302.
Soden, H. von : Essential Oils Extracted from Flowers by Volatile Solvents, 79.
Soden, H. von, and W. Treff : Characters of Nerol, 122.
Soden, H. von, and W. Treff : Two new Constituents of Rose Oil, 158.
Sodium Agaricate, 242.
Sodium Arsenate and Lead Acetate, Interaction of, 165.
Sodium Arsenate, Official, and Solution of Sodium Arsenate, 166.
Sodium Arsenate Solution, 302.
Sodium Cacodylate in Phosphaturia, 242.
Sodium Cinnamate, Glycerin of, 281.
Sodium Ichthyol, 218.
Sodium Lygosinate, 227.
Sodium Monosulphide or Potassium Ferrocyanide as Indicators in saccharimetry, 159.
Sodium Parasulphobenzoate as an Internal Antiseptic, 242.
Sodium Sozoiodate, 243.
Soft and Hard Soaps, 302.
Soft Soap, 302.
Soltmann, O. : Cypress Oil as a Remedy for Whooping Cough, 201.
Solubility of Chemical Substances mentioned in B.P., 1898, 303, 304.
Solubility of Resins in Liquids, 155.
Solubility of Strychnine in Mixtures with Alkalies and Iodides, 306.
Soluble Antiseptic Powder, 262.
Solution, Antiseptic, Alkaline, 262.
Solution of Ammonium Valerianate (Pierlot), 277.
Solution of Antimony Chloride, Sulphates in, 26.
Solution of Cresol with Soap, 275.
Solution of Sodium Arsenate, Assay of, 166.
Sommerville, D. : Drigalski and Conradi's Medium for Differentiation of *Bacillus coli communis* and *B. typhosus*, 315.
Soothing Ointment, 350
Sparkling Beverage, Cheap and Wholesome, 350.
Sparteine, 168.
Sparteine Sulphate, Composition and Volumetric Determination of, 169.
Spearmint, Essential Oil of, Valuation of, 19.
Spermacoce indica, Seeds of, 243
Spiegel, L. : Further Notes on Yohimbine, 183.
Spigelia, *Ruellia ciliosa* as Adulterant of, 244.
Spike Lavender Oil, Adulterated, 169.
Spilanthes oleracea, Constituents of, 170.
Spineanu, G. D. : Acetyl Chloride as a Digestive Stimulant, 188.
Spirit of Anthrasol, 261.
Spirit of Ants, 275.
Spirit of Soap, Hebra's, 275.
Spiritus Saponis Viridis (L.R.I.), 278.
Spurious Virginian Prune Bark, 252.
Squill, Oxymel of, 303
Standardized Powdered Alcoholic Extracts, 464.
Stavenhagen, H , and S. Gulli : Citral Content of Lemon Oil, 111.
Steatins, 271.
Stephanotis Bouquet, 350.
Stevens, H. B., and E. W. Lucas : *Pilula Ferri*, 297.

Stini, —: Germ-free Clinical Thermometers, 323.
Stipa vaseyi, a Narcotic Grass (Bailey), 170.
Stockings, W. E., and J. Drugman: Action of H_2S on Formaldehyde and Acetaldehyde, 99.
Stovaine, 244.
Stramonium Seed Oil, 76.
Strauss, —: Epithol Varnishes, 272.
Strophanthus gratus, Pharmacognosy and Chemical Constituents of, 244.
Strychnine, Action of Bromine and Iodine on, 171.
Strychnine Ethyl-bromide, 21.
Strychnine Methyl-bromide, 21.
Strychnine Methyl-chloride, 21.
Strychnine Methyl-nitrate, 22.
Strychnine Methyl-sulphate, 21.
Strychnine, Solubility of, in Presence of Alkalies and Iodides in Mixtures, 306.
Studer, B., and A. Tschirch: American Colophony, 68.
Styptol, 247.
Stryzsowski, C.: Hydriodic Acid as a Microscopical Reagent for Blood, 316.
Subcutine, 247.
Substances liable to Decomposition by Light, 351.
Substitute for Tragacanth Mucilage, 311.
Sucrose in Vegetables, 172.
Sugar in Urine, Detection of, with Phenylhydrazine Oxalate, 178.
Sulphates in Antimony Chloride Solution, 26.
Sulphocyanide in Saliva, Detection of, by means of HgCl, 161.
Sulphur Iodide, Method of Manipulation, 308.
Sulphurated Lime, Valuation of, 173.
Sulphuretted Hydrogen, Action of, on Formaldehyde and Acetaldehyde, 91.
Sunburn and Complexion Lotion, 351.
Suppositories, Boroglycerin, 264.
Suppositories, Glycerin, 280.
Suppositories, Pilewort, 296.
Suppository Basis, New, Copraol, 269.
Suppository Moulds, Improved, 308.
Synthetic Bouquets, 317.
Synthetic Cassie Oil, 47.
Syrup, Compound, Bromoform, 276.
Syrup, Compound, of Glycerophosphates, 281.
Syrup, Easton's, Modified Process for, 272.
Syrup, Iodotannin, 285.
Syrup of Catechu, 276.
Syrup of Codeine Phosphate, 277.
Syrup of Convallaria, 277.
Syrup of Dionine, 276.
Syrup of Hydriodic Acid, Permanent, 284.
Syrup of Jaborandi, 277.
Syrup of Licorice, 277.
Syrup of Magnesium Sulphate, Palatable, 309.
Syrup of Maize stigma, 277.
Syrup of Nickel Bromide, 293.
Syrup of Phenol, 276.
Syrup, Rami's, 276.
Szendrö, J.: Lygosine Quinine as an Application for Suppurating Wounds and for Epistaxis, 228.

T.

Table for Conversion of Grains to Grammes, 594.
Table for Conversion of Thermometric Scales, 595–596.
Table showing Equivalent Rates per lb. and cwt., 599.
Table showing Value of 1 lb. and 1 cwt. in English Money when the Article is quoted per kilo in francs, 597–598.
Tables of Useful Information for Pharmacists, 593–607.
Tablets, Chocolate, 266.
Tamarind Conserve Laxative, 309.
Tamarind Essence, 309.
Tankard, A. R., and A. H. Allen: Determination of Boric Acid in Cider, Fruits, etc., 483.
Tannalbin, Preparation of, 309.
Tannochrom, 247.
Tar Soap, Liquid, 276.
Tar Water, Concentrated, 310.
Taraktogenos kurzii Seeds, Constituents of, 48.
Tardy, E.: Essential Oil of Bold Leaves, 42.
Tartaric Acid, Distinctive Test for, 173.
Taylor, F. O.: Characters of Gum Chicle, 215.
Tea Seed Oil, 127.
Terpene Compounds, Formation of,

in the Chlorophyll, containing Organs of Plants, 174.
Terpineol in Camphor Oil, 46.
Thalleioquin Reaction for Detection of Quinine, 150.
Theatrical Rouge, 346.
Therapeutic Application of Radium, 237.
Therapeutics of Ichthyol Compounds, 218.
Theobromine as a Hypnotic, 248.
Theobromine, Quantitative Determination of (Katz), 174.
Thermodin, 248.
Thermometric Scales, Conversion of, 595–596.
Thibault, P.: Bismutho-protocatechuic Acid, 41.
Thibault, P.: Bismuth Phthalate, Mellate, and Pyrophoric Bismuth, 40.
Thoms, H.: Determination of Eugenol in Clove Oil, 82.
Thoms, H.: Essential Oil of *Monodora myristica*, 118.
Thoms, H.: Presence of Myristicin in French Oil of Parsley, 131.
Thoms, H., and B. Molle: Cineolene, 56
Thoms, H., and B. Molle: Essential Oil of *Laurus nobilis* Leaves, 107.
Thoms, H., E. Gilg, and H. Schedel: Pharmacognosy and Chemical Constituents of *Strophanthus gratus*, 244.
Thorpe, T. E.: Electrolytic Method for Determining Minute Quantities of Arsenic, 30.
Thorpe, T. E., and J. Holmes: Estimation of Methyl Alcohol in Presence of Ethyl Alcohol, 116.
Thyme, Compound, Fluid Extract of, 310.
Thymus Gland Extract, 310.
Thymyl Trichloracetate, 249.
Tiemann, R.: Constituents of *Globularia alypum*, 94.
Tinct. Conii, Standard for, 310.
Tinct. Digitalis, Standard for, 210.
Tinct. Hamamelidis, Standard for, 311.
Tinct. Krameriæ, Standard for, 311.
Tinct. Lupuli, Standard for, 311.
Tinct. Myrrhæ, Standard for, 311.
Tinct. Quillaiæ, Standard for, 311.
Tinct. Senegæ, Standard for, 311.
Tinct. Stramonii, Standard for, 311.
Tinct. Zingiberis, Standard for, 311.
Tincture of Aconite, Alkaloidal Assay of (Beuttner), 86.
Tincture of Belladonna, Alkaloidal Assay of (Beuttner), 87.
Tincture of Benzoin, Compound, Total Solids in, 37.
Tincture of Cinnamon, 266.
Tincture of Cinchona, Alkaloidal Assay of (Beuttner), 86.
Tincture of Opium, Determination of Morphine in (Dowzard), 119, 121.
Tincture of Gelsemium, Alkaloidal Standard for, 279.
Tincture of Hyoscyamus, Alkaloidal Assay of (Beuttner), 87.
Tincture of Iodine, Determination of Alcoholic Strength of, 101.
Tincture of Ipecacuanha, Alkaloidal Assay of, 87.
Tincture of Kola, 277.
Tincture of Nux Vomica, Alkaloidal Assay of (Beuttner), 86.
Tinctures of Digitalis, Chemical and Physiological, Assay of, 541.
Tinctures, Alkaloidal Assay of (Beuttner), 85.
Tinctures, Citric Acid to Prevent Precipitation of Certain, 267.
Tinctures, Official, Notes on Suggested Standards for, 310.
Todd, A. M.: Early History of Peppermint and Modern Commercial Development, 232.
Toilet Ammonia, 351.
Toilet Soap Perfumes, 340.
Toison's Fluid for Blood Counts, 351.
Tolley, J. E.: Cinchonine Sulphate for Coryza, 199.
Tooth Paste, Saponaceous, 349.
Toothache Remedy, 351.
Toxicity of Lithium Salts, 227.
Tradescantia erecta as a Hæmostatic, 249.
Tragacanth, Mucilage of, Substitute for, 311.
Treff, W., and H. von Soden: Characters of Nerol, 122.
Treff, W., and H. von Soden: Two New Constituents of Rose Oil, 158.
Trevithick, E.: Tubercle Bacilli in Urine, Method of Demonstrating, 301.
Trigemine, 249.
Trillat, A.: Formaldehyde a Natu-

ral Constituent of Combustion Products, 91.
Trioxymethylene Method of Titration (Kleber), 22.
Trochis-cacao, 266.
True, R. H.: Ruellia Ciliosa as an Adulterant of Spigelia, 244.
Tschirch, A., and L. Reutter: Caricari Elemi, 77.
Tschirch, A., and L. Reutter: Resin of *Pistacia lentiscus*, 144.
Tschirch, A., and O. Saal: Carana Elemi, 77.
Tschirch, A., and O. Saal: Elemi of *Colophonia*, 67.
Tschirch, A., and B. Studer: American Colophony, 68.
Tschirch, A., and G. Schmidt: Constituents of Austrian Turpentine, .
Tschirch, A., and G. Schmidt: Resin Acids of the Conifers, 152.
Tschirch, A., and L. Weil: Constituents of Gurjun Balsam, 98.
Tubercle Bacilli in Urine, Method of Demonstrating, 351.
Turmeric, Rapid Detection of, in Powdered Rhubarb, 249.
Turmeric, Test for, 250.
Turpentine Embrocation, 312.
Turpentine Liniment, 312.
Tutin, F., and F. B. Power: Chemical Examination of *Gymnema sylvestre* Leaves, 526.
Tutin, F., and F. B. Power: Lævo-quercitol from Leaves of *Gymnema sylvestre*, 98.

U.

Umbellularia californica, Constituents of the Essential Oil of, 174.
Umbellulone, 175.
Umbellulone, and Derivatives of, 175.
Umney, J. C.: Ash of Certain Drugs, 203.
Umney, J. C.: Cajuput Oil, 44.
Umney, J. C.: Official sp. gr. of English Lavender Oil, 108.
Umney, J. C., and C. T. Bennett: American Orange Flower Oil, 124.
Umney, J. C., and C. T. Bennett: Fish Liver Oil, 88.
Unguentum extensum Hydrarg. bichlor., 271.
Unguentum extensum Hydrarg. subchlor., 271.
Universal Domestic Ointment, 352
Unna's Glycerogelatin of Iodoform, 271.
Unna's Glycerogelatin of Salicylic Acid, 271.
Unna's Hard Glycerogelatin of Zinc, 271.
Unna's Ichthyol Pasta, 271.
Unna's Soft Zinc Paste, 270.
Upsher Smith, F. A.: Cultivation of Valerian Rhizome in Derbyshire, 557.
Urbain, E., and L. Saugon: Hydrolyzing Action of Castor Oil Seeds, 319.
Urea, Some Properties of, 352.
Uric Acid, Correction Scale for the Dimmock-Branson Process, 525.
Urine, Detection of Acetone in, 177.
Urine, Detection of Albumin in, by Salicylsulphonic Acid, 176.
Urine, Detection of Sugar in, with Phenylhydrazine Oxalate, 178.
Urine, Detection of Urobilin in, 178.
Urine, Determination of Salicylic Acid in, 178.
Urine, Method of Demonstrating Tubercle Bacilli in, 351.
Urobilin, Detection of, in Urine, 178.
Ursone, Distinction of, from Cholesterol, 117.

V.

Valerian Rhizome, Cultivation of, in Derbyshire, 587.
Valeur, A., and C. Moureu: Sparteine, 168.
Vanadic Acid, 250.
Vanilla, Presence of Heliotropin in Certain Varieties, 250.
Vanilla Essence, 352.
Vanillin, Oxidation of, by Russula Ferment and by Gum Acacia, 353.
Vanzelli, —, and — Kerner: Olivile, 128.
Various Useful Data, 605.
Varnishes, Epithol, 272.
Varnish for Patent Leather, 340.
Varnishes, Skin-coloured, 294.
Vegetable Powders and their Diagnostic Characters, 251.
Vegetable Tallow, 240.
Veronal, 251.
Vesicant, Bidet's, 277.
Victoria Bouquet, 353.

Vinegar, Cider, Analysis and Standards for, 54.
Vinegar, Detection and Determination of Mineral Acid in, 16.
Violaceæ, Salicylic Acid in, 160.
Violet Brilliantine, 318.
Violet Oil from Flower Extract, 80.
Violette Royal Bouquet, 317.
Viper Venom, Action of Radium Rays on, 152.
Viper Venom, Natural Immunity of Vipers to, 353.
Virginian Prune, Spurious, 252.
Volumetric Determination of Arsenious Tri-iodide, 34.
Volumetric Determination of Cyanogen, 75.
Volumetric Determination of Persulphates, 139.
Volumetric Determination of Sparteine Sulphate, 169.
Votes of Condolence to the Families of the late A. H. Allen and W. Ward, 577.
Vournasos, — : Detection of Acetone in Urine, 177.
Vuillemin, — : Determination of Essential Oil in Mustard, 122.

W.

Waliaschko, N. : Robinin, 158.
Walnut Hair Dye, 354.
Warin, J. : Determination of Chichotannates in de Vrij's Liquid Extract of Chinchona, 55.
Water, Carbolic, 275.
Water, Cresol, 275.
Water, Detection and Determination of Nitrites in, 180.
Water Free from Ammonia, Preparation of, 180.
Water, Hæmostatic, Pagliari's, 296.
Water, Imperial, 262.
Water, Licorice, 274.
Water Melon Oil, 127.
Water, Reaction for Nitrites and for Zinc in (Blunt), 179.
Water, Tar, Concentrated, 310.
Watkins, H. C., and J. O. Schlotterbeck : Constitution of Chelidonine, 50.
Waxes, Determination of Melting Point, 114.
Weems, J. B., C. E. Gray, and E. C. Myers : Water Free from Ammonia, 180.
Weights and Measures of Imperial System, 606.
Weights and Measures of Metric System, 606.
Weil, — : Euguform, 212.
Weil, L., and A. Tschirch : Constituents of Gurjun Balsam, 98.
Welding Powders for Iron and Steel, 354.
West Indian Elemi, 95.
West Indian Grass Oils, 96.
White, A. D., and L. Dobbin : A Simple Mode of Preparing Synthetic Populin (Benzoyl-Salicin), 506.
White, E. : Constitution of Kino tannic Acid, 102.
White Heliotrope Bouquet, 317, 342.
White Lilac Bouquet, 354.
White Mustard Seed, Fixed Oil of, 128.
Whooping Cough, Cypress Oil as a Remedy for, 201.
Wiegel : Cativo Balsam, 198.
Wijs, J. A. : Some New or Little Known Fixed Oils, 127.
Wilkinson's Ointment with Anthrasol, 262.
Wilson, H. : Dispensing Resinous Tinctures, 299.
Window Frosting, 354.
Wine, Detection of Saccharin in, 159
Wine, Ipecacuanha, Alkaloidal Assay of (Beuttner), 87.
Wingrave, Wyat : Iodotannin Syrup, 285.
Wobbe, W. : Anæsthetic Ether, 81.
Woods, H. : Sodium Parasulphobenzoate as an Intestinal Antiseptic, 242.
Wort, Detection of Arsenic in, 33.
Wounds, Suppurating, Lygosine Quinine as Application for, 228.
Wright, R., and E. H. Farr : Disputed Presence of Mydriatic Alkaloid in *Lactuca virosa*, 105.
Wright, R., and E. H. Farr : Distribution of Alkaloids in *Conium maculatum*, 69.
Wright, R., and E. H. Farr : Note on Powdered Standardized Alcoholic Extracts, 464.

X.

Xanthoxylins, 180.

Y.

Yangonin, a Crystalline Body from *Piper methysticum*, 181.
Yeast Extract, Detection of, 182.
Yeast in Glanders, 354.
Ylang Ylang Sachet, 347.
Yohimbine, Colour Reaction of, 183.
Yohimbine, Further Notes on (Spiegel), 183.
Yohimbine Hydrochloride, 253.
Yomugi Oil, 35.

Z.

Zalakas, —: Caffeine as antidote for Nicotine, 231.
Zinc Carbonate, Official Formula for, 111.
Zinc Glycerogelatin, Hard, Unna's, 271.
Zinc Ichthyol, 218.
Zinc in Water, Reaction for, 179.
Zinc Paste, Soft, Unna's, 270.
Zinc Salicyl (Lassar), 270.
Zinc Sulphate, Manganese in, 112.
Zinc Sulphur Paste, Unna's, 271.

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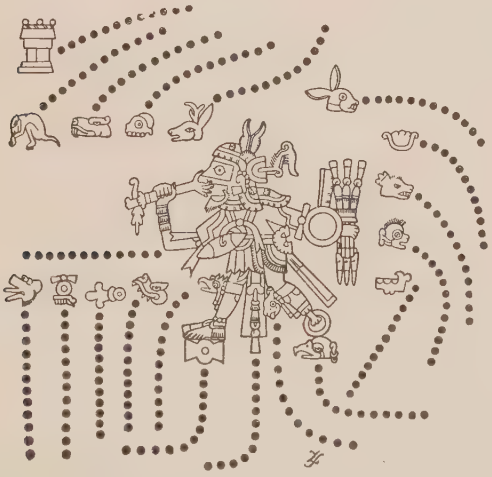

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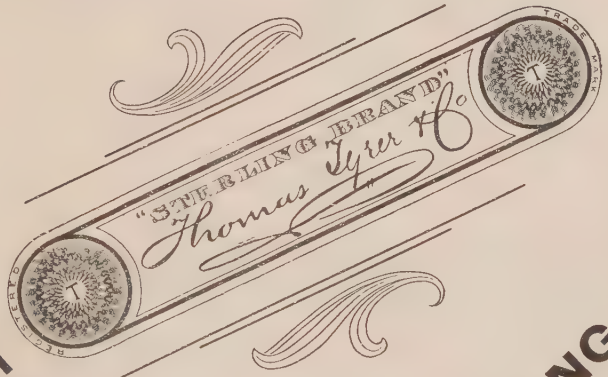

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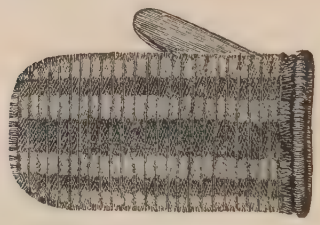

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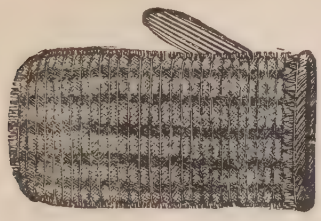

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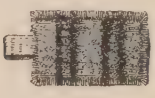

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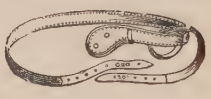
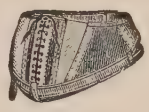
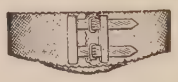

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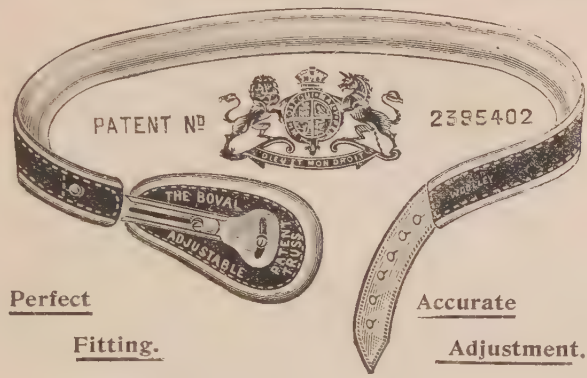

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INDEX TO ADVERTISEMENTS.

PAGE

Atkinson & Barker's Royal Infants' Preservative 662
Atkinson (G.) & Co.'s Specialities in Drugs and Chemicals . . . 659
Attfield's (Dr.) Chemistry (Gurney & Jackson) 646
Ayrton, Saunders' & Kemp, Wholesale Druggists 654

Beale's (Dr. L. S.) Books 646
Benger's Food 661
Boehringer & Soehne's Cocaine and Quinine 666
Bradley & Bourdas's American Cherry Pectoral 662
Burrough's (James), Wines, etc. 663
Burroughs Wellcome & Co.'s Chemicals 645
Bush & Co.'s Essential Oils . . . . . Inside front cover, page 2

Certification of Opticians by Worshipful Company of Spectacle Makers 672
Chaplin (W. H.) & Co.'s Wines and Spirits 668
Christie's (G.) Bottling Wires 668
Christy (T.) & Co.'s Lanoline, Tooth Pastes, etc. 664
Churchill's (J. & A.) Publications . . 647 and Inside end cover, page 1

Dinneford & Co.'s Horse-Hair Goods, etc. . . . . 670 and 671

Erhardt (H.) & Co.'s Tinfoil, Parchment and Skins 664
Evans, Sons, Lescher & Webb, Wholesale Druggists . . 652 and 653

Fink (F.) & Co.'s Specialities in Glycerine, Gums, etc. 666

Guest (T.) & Co.'s Lozenges, etc. 662

Harker, Stagg & Morgan's Assayed Drugs, Spirits, etc. . . . 658
Haywood's (J. H.) Elastic Surgical Appliances 672
Hearon, Squire & Francis, Wholesale Druggists. Inside front cover, page 3
Hirst, Brooke & Hirst's Drugs, Chemicals, etc. 663
Home (G. Y.) & Co.'s Quinine and Orange Wine 668
Hooper, Struve & Co.'s Brighton Seltzer Water. Inside end cover, page 2
Hopkin & Williams' Fine Chemicals 648
Houlder, Son & Co.'s Acids, Commercial and Pure 656
Howards & Sons' Quinine and other Chemicals 648

Idris & Co.'s Royal Mineral Waters . . Inside front cover, page 1
Ince's Latin Grammar of Pharmacy (Baillière & Co.) 646
Ingram & Royle's Natural Mineral Waters, etc. 665

PAGE

Jewsbury & Brown's Oriental Tooth Paste 660

Macfarlan (J. F.) & Co.'s Pharmaceutical Preparations . . . 655
Martindale (W.), Wholesale Chemist 656
Martindale & Westcott's Extra Pharmacopœia (H. K. Lewis) . . 646
Mather's (W.) Plaisters, Fly Papers, etc. 667
Mills & Co.'s Bourne Table Waters 666

Orridge & Co.'s Chemists' Transfer Agency 658

Poths (H.) & Co.'s Bottles and Jars 660
Potter & Clarke's Drugs and Herbs 669
Powell & Barstow's Instruments and Stockings 672

Raimes & Co., Wholesale Druggists 660
Ransom (W.) & Son's Specialities 657
Renner's (Dr.) Establishment for Calf Lymph Vaccination . . . 658
Richford's (C. D.) Rubber Stamps 664
Ridge's (Dr.) Food 654

Sanford & Son's Rat Poison 666
Smith (T. H.) & Co.'s Morphine, Codeine, Chloroform, etc. . . . 664
Symes & Co.'s Ol. Lavand. Rect., etc. 656

Tyrer (Thomas) & Co's Preparations 649

Whiffen's (T.) Quinine and other Preparations 659
White (Alfred) & Sons' Æthers, Bismuth, etc. 654
White and Humphrey's 'Pharmacopedia' 646
Woolley (J.), Sons & Co., Drugs and Surgical Appliances . 673 and 674
Wright, Layman & Umney, Wholesale Druggists . . 650 and 651

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